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Section of Dermatology

President—HENRY MACCORMAC, C.B.E., M.D.

[*June* 20, 1935]

Lichen Spinulosus with Cicatricial Alopecia.—H. W. BARBER, M.B.

Mr. J. T., aged 64, had herpes zoster in 1930, involving the left sacral and crural regions. The condition now seen has been present for about two years.

On examination.—Scalp: Extensive cicatricial alopecia, involving chiefly the vertex and extending to the forehead. In many of the follicles are horny plugs; there are also some follicular pustules. Arms: Areas of lichenification along extensor surfaces, associated with some follicular spines and pustules, especially near the elbows. Trunk and legs: On the midline of the chest and abdomen, the flanks, buttocks, backs of the thighs and calves, are lesions of lichen spinulosus intermingled with a few follicular pustules. Face: Some lichenification of the nose and of the malar regions with some horny follicular plugs.

This is clearly one of those cases, of which Sir Graham Little, Dr. Dore and others have shown examples, in which cicatricial atrophy of the scalp is associated with lichen spinulosus of the trunk. I incline to the view that the combination is really a variety of lichen planus, but in the present case there are no lesions that really correspond to the ordinary plane papules of this disease, nor is the buccal mucous membrane involved.

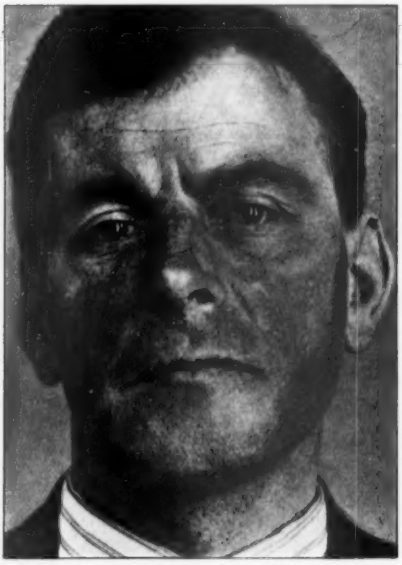
Dr. J. M. H. MACLEOD said that the case was interesting in that the lichenoid lesions were associated with follicular pustules; these he considered to be secondary, and he regarded the condition as essentially a keratosis of the mouth of the follicle and the name which Unna had given to it—keratosis follicularis spinulosa—as being most appropriate. Certain cases of this sort had been described as lichen spinulosus associated with folliculitis decalvans, but such a name was unsatisfactory, as the condition was not a true folliculitis, but was a hyperkeratosis.

Iron-stone Pigmentation of the Face (with Natural and Infra-red Photographs).—W. J. O'DONOVAN, M.D.

I am collecting a series of photographs of characteristic marks of trade and occupation left upon the skins of professional and manual workers.

The photograph (fig. 1) is of a man aged 41. He was sent to me by Dr. L. Backus on 30.4.35 for suggestions as to the removal of a deformity of the face. Four and a half years ago he was injured by a dynamite explosion in an iron mine. After recovering from the first effects of the accident his face has remained in the stippled, bluish-black condition that he presents this afternoon. The photograph, taken by ordinary studio technique was, in effect, most disappointing as a record of deformity. On the same day Mr. Suggers, photographer to the London Hospital, also took

a photograph (fig. 2) by the Ilford infra-red process, with the customary filter and artificial light, namely a 1,600-watt Osram lamp. The second photograph shows, by contrast with the first, the great aid this new technique can be in recording subcutaneous foreign-body deposits. It is interesting to record that the photographer



Iron-stone explosion effects.

FIG. 1.—Photograph taken by ordinary method. FIG. 2.—Photograph taken by infra-red process.

whose work has found much recognition in this Section for many years past, learned his art in Dr. Sequeira's department in the pioneer days of X-ray therapy, and has himself been shown here as a case of multiple basal-celled carcinoma of the trunk and face, due to his early occupational exposure to X-rays.

? Angio-fibrosarcoma. — W. N. GOLDSMITH, M.D., and W. FREUDENTHAL, M.D.

K. H., male, aged 2 years and 11 months. This child was shown at a meeting of the Section on December 21, 1933, by the President, under the title "Ulcerating Keloid in an Infant."[1] When first seen by Dr. MacCormac in December 1932 there was present, over the centre of the lower part of the back, an oval ulcerated surface 2½ in. across and 1½ in. vertically. A small "typical keloid" was present at the side of the main lesion. The parents had first noticed the raised patch when the child was aged six weeks. One year later it became ulcerated, leaving a rim of hard tissue, and in this form it persisted. The histological appearances were considered consistent with keloid, but Dr. MacCormac stressed the rarity of keloids in infants and the rarity of ulceration in any keloid.

I (W. N. G.) first saw him at the end of 1934. The ulcer was then much as had been described by Dr. MacCormac, but there were now several outlying brown hard nodules at some distance from the main ulcer and not apparently connected

1 *Proceedings*, 1934, xxvii, 721 (Sect. Derm., 39).

with it. The border around the hard edge was deeply pigmented, and clinically I even thought of the possibility of a melanocarcinoma. There was a slight overgrowth of hair and there were dilated veins in the neighbourhood. A skiagram taken earlier is said to have shown no bony changes.

The whole area, including all the outlying nodules, was exposed to X-rays on January 26, February 7 and February 14, the dosage being 144 r., 150 kv., ½ mm. of copper. After this very moderate amount had been given the treatment was stopped because the ulcer was getting worse. The after-effects, however, proved it to have been beneficial, for in a few weeks a great improvement set in and the ulcer has now nearly epithelialized over, and is much smaller. The outlying nodules have also almost disappeared; one of them has been excised. The ulcer still retains its conspicuous raised edge.

Histology (W. F.).—Biopsies were made from the edge and the centre of the ulcer and from an outlying nodule. All of them show a proliferation of connective tissue. This proliferation corresponds, in some parts, to the picture of a keloid, but in others it reminds one of a fibrosarcoma; in addition there is an angiomatous component.

Comment.—As the histology suggests, but does not conclusively prove, the diagnosis of angio-fibrosarcoma, we have to look for other arguments in its support. Sarcomas are not uncommon in early childhood. They have been observed even in the fœtus; they have even been denoted as a form of tumour characteristic of childhood. MacCormac forms a special group of "infantile sarcoma" in his classification of primary sarcomas of the skin (in his paper read at the 9th meeting of the British Association of Dermatology in Glasgow, 1929). Many of those cases, as described especially by Dubreuilh, show a distinct angiomatous component. Further, these angiosarcomas are situated, by preference, in the region of fœtal clefts (fissural angiomas of Virchow). In our case the localization would be consistent with the development of such a fissural angioma. Furthermore, the ulceration of a keloid has, as MacCormac has said, not yet been observed; the ulceration of a sarcoma, on the other hand, is not unusual. Finally, the good effect of small doses of X-rays can be reckoned in favour of the diagnosis of angiosarcoma, as keloids, if they respond to X-rays at all, generally do so only to very intensive irradiation.

Peculiar Fracture of Hairs.—W. N. GOLDSMITH, M.D.

K. P., male, aged 19.

Present condition.—The hair has receded about an inch from the forehead and temples. Along the present margin is a narrow strip of short bristly stumps, pointing in all directions. There is no sign here of folliculitis. A little lower on the forehead is a zone of moderate erythema with an occasional pustule; in this area are some hair-stumps.

History.—The disorder was first noticed nine months ago, since when the recession has taken place. It is now about stationary.

Microscopical examination.—The short hairs show none of the features of trichorrhexis nodosa, monilethrix, or alopecia areata, and they contain no fungus. They are distorted and the free ends are not frayed but are smoothly sealed off.

Discussion.—Dr. A. C. ROXBURGH said that he had seen a similar case a few days ago at St. Bartholomew's Hospital. The patient had a triangular area of short hair extending downwards on to his forehead for about an inch-and-a-half from the anterior hair margin.

The short hairs were about ¼ in. long; they were perfectly normal in appearance and their points were diagonal, as though cut with scissors. The patient said that the hair had suddenly appeared there a few weeks before.

THE PRESIDENT said he thought that the hairs in this case also looked as if they had been cut off; they had an even and regular surface. And the man's demeanour rather suggested an artefact.

? Pemphigus Vulgaris: Case for Diagnosis.—H. SEMON, M.D.

Male, aged 76. Nothing in the past history of importance to the present issue. Fifteen years ago, prostatectomy; two years ago, papilloma of bladder. The urine is acid and, although there are no urinary symptoms, contains some albumin, a few pus cells, and scanty Gram-positive cocci of streptococcal type on culture.

The blood-pressure is 180/110, and a tremor of the right hand occasionally, and the facies suggest early Parkinson's syndrome. The patient is edentulous.

The present condition began in March 1935, with general irritation of the trunk and limbs, and an ill-defined rash, and was preceded by vague malaise. About seven weeks ago a few bullæ appeared on the front of both legs, and one or two on the scalp and forearms. Since the patient has been under observation in hospital the latter areas have been free, but the lesions have continued to erupt in small crops, without any irritation, quite symmetrically, and usually during the night, on both shins only. The bullæ are flaccid, and appear without preceding erythema, on an apparently normal base. The contents are sterile on culture and do not contain eosinophils. On rupture they remain relatively clean, and heal without suppuration in about a week.

The pruritus, which is troublesome at night, appears to be associated on the lower abdomen with very slight infiltration and a brownish discoloration, which is stated to have been present before the administration of Fowler's solution for only a week or two before admission.

The Wassermann reaction is negative, and a differential blood-count reveals a 10% eosinophilia. The blood-urea and blood-sugar curves are normal.

The bowel has been constipated for a long time, and the fæces contain a slight excess of streptococci.

Discussion.—Dr. H. W. BARBER said he did not think the fact that the condition itched excluded pemphigus. He had a typical case of pemphigus now under observation, so severe that some of the lesions were approaching those of pemphigus vegetans. The patient was given a few injections of germanin, and he improved and left hospital, but he continued to get occasional bullæ. He had been kept on quinine and hexamine, as suggested by the President, and was later able to resume his work. His complaint now was of severe itching, chiefly on the original sites of the pigmented lesions.

Dr. SEMON said that the itching in this case was [illegible] everywhere except where bullæ were developing.

Dr. MACLEOD said that the diagnosis of dermatitis herpetiformis was worth considering in spite of the age of the patient.

Dr. J. H. SEQUEIRA remarked that against the idea of dermatitis herpetiformis was the age of the patient; he could not recall a case of a first attack at the age of 76. The eosinophilia, of course, favoured the diagnosis.

Postscript (16.7.35).—An injection of germanin (Bayer 205) 0·5 grm., given on July 8, was followed by apparent increase of the bullæ on the legs, without any diminution of the pruritus. [H.S.]

Epithelioma adenoides cysticum.—I. MUENDE, M.B.

At the last meeting of the Section Dr. Goldsmith and Dr. Freudenthal showed an interesting case of Brooke's disease, which displayed two features of note.[1] The first was the presence of blackish dots in the lesions, and the other a central umbilication not unlike that of molluscum contagiosum. Although the occasional presence of pigmentation appears to have been overlooked in most modern text-books, it was described and illustrated by Perry in the "International Atlas of Rare Skin Diseases" (No. IX).

Molluscum contagiosum-like papules appear to have passed unrecognized until Dr. Goldsmith and Dr. Freudenthal presented the case referred to. I suggested that

[1] *Proceedings*, 1935, xxviii, 1528 (Sect. Derm., 62).

the central depression probably represented the dilated mouth of an enlarged hair follicle which contained a comedo-like body, and that the epithelioma most likely took its origin from the hair follicle.

The section illustrated was taken from a case which I examined two years ago, and which had the same clinical appearance.

The histology shows a large papule, in the centre of which there is a very enlarged dilated follicle containing the remains of a comedo-like structure. Peripherally there are numerous epithelial strands containing masses of concen-

Dr. Muende's case of epithelioma adenoides cysticum.

trically arranged horn-cells. This tissue, conforming with the histology of epithelioma adenoides cysticum, can be seen to arise both from the superficial epidermis and also from the lower part of the follicle, where tongue-like buds take their origin. These buds are composed of oval cells and have a uniform surrounding palisade layer.

This section is shown because I believe that it demonstrates rather strikingly the origin of Brooke's disease from the hair follicle.

Dr. FREUDENTHAL said he considered that this was an important case, as it confirmed the histological connexion between comedone nævus and epithelioma adenoides cysticum.

? von Recklinghausen's Disease: Case for Diagnosis.—C. H. WHITTLE, M.D.

G. T., male aged 48. This patient presents many nodules in the skin, not tender, mostly bluish in colour, and varying from $\frac{1}{8}$ in. to 1 in. in size. The smaller nodules are soft and feel cystic, but the larger ones about the elbows are very firm.

In addition there is a bluish plaque on the upper part of the back, an inch or so in diameter, which is not raised and appears to be a nævus.

A tentative diagnosis of multiple angiomata was made.

Report on biopsy (section from one of the tumours).—The tumour is composed of fibrous tissue which contains a fair number of simple blood-vessels and also a few obvious nerve-fibres. Probably this is a neurofibroma with an angiomatous element.

Note.—The patient is under treatment for pernicious anæmia.

Dr. F. PARKES WEBER said he considered this case to be one of von Recklinghausen's disease, and probably all the nodules, though they varied in appearance, were neurofibromata. There were patches of discoloured skin, which might be regarded as taking the place of the typical pigmentation of neurofibromatosis. Dr. Whittle had spoken of the possibility of angioma being associated with neurofibromatosis; that, of course, was possible, as the latter was occasionally associated with a great variety of other conditions. In this patient there was a striking hairy mole or nævus on the left upper arm.

? A Form of Sclerodermia: Case for Diagnosis.—C. H. WHITTLE, M.D.

F. N., a married woman aged 60, first noticed pain behind the knees in September 1934, and had gradually increasing difficulty in extending the joints fully. A similar condition was noticed in the elbows and hands in March 1935.

Present condition.—The hands, elbows, and knees cannot be fully extended, on account of firm contraction and thickening of the fascia in these parts. In the hands the whole of the palmar fascia seems to be involved, and in the elbows and knees the deep fascia in the flexure of the joints is felt as a thickened band preventing full extension of the joints. Deformity and impairment of function of the limbs have resulted, and the patient walks on her toes, partly owing to the popliteal contracture and partly also from contraction of the plantar fascia, I think.

She is a fat subject but has lost one stone in weight during the last three months.

Sugar tolerance curve normal. Basal metabolic rate + 24%.

Skiagrams of knees (Dr. Ff. Roberts) "show lipping of the articular margins of the femora, tibiæ and patellæ."

Dr. F. PARKES WEBER said that he regarded this case as one of an exceeding rare ("deep") type of sclerodermia, in which the skin itself was hardly involved, though deeper fascial and other fibrous structures, and possibly muscle, were hardened. The symmetrical distribution of the changes showed that the case could not be classed as one of morphœic sclerodermia.

Giant-cell Sarcoma.—A. M. H. GRAY, C.B.E., M.D.

The patient is a man aged 87, who first saw me on May 29, 1935, on account of a painful swelling on the left leg. He stated that this had been present for about four months; the first thing he noticed was pain on pressure; afterwards the redness and swelling developed. The lump has gradually been increasing in size until it now forms a raised, dull red, lobulated swelling about 2 in. long by $1\frac{1}{2}$ in. across, at the junction of the middle and lower thirds of the left leg. It is hard to the touch and distinctly tender, especially on pressure. The whole lump can be moved over the underlying tissues.

On clinical examination I was unable to decide whether this was a granuloma or a new growth. A small portion was removed for microscopic examination, and Dr. Freudenthal reports on the section as follows:—

"The main changes were that the connective tissue was largely destroyed and replaced by a highly cellular deposit, formed mostly by spindle-shaped cells and a considerable number of scattered giant-cells. They were neither excessive in size nor usually very multinucleated. Many of them had only one large nucleus, others

two or three, and only a few still more nuclei. The nuclei showed a great variety of irregular forms and were localized either in the centre or at the margin of the cells. There was a considerable hæmorrhagic extravasation in some parts of the tumour."

The case thus appears to be one of giant-cell sarcoma, a condition which is extremely rare. There seems to be some doubt as to the exact nature of these tumours, whether they are primary sarcomata of the skin, whether they are associated with a primary myeloma of the bone, or whether they have some relation to xanthoma. A skiagram shows, in this case, no disturbance of the underlying bone.

Further investigations are proceeding.

Two Cases of Pre-auricular Fistula.—ROBERT KLABER, M.D.

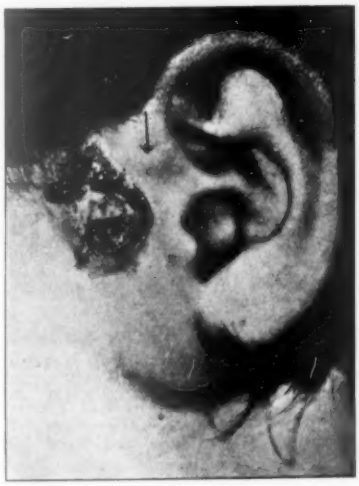
Both these cases show pyogenic pre-auricular lesions, resulting from infection of a congenital cyst situated in the "crus-helicis" of the ear.

I have only been able to find a few dermatological references to this condition. It was first described in this country by Sir James Paget, in 1878, as "pre-auricular Fistula."

Stammers has recently recorded six cases. He notes the striking constancy in the position of this cyst, and thinks it more likely that it arises from imperfect fusion of two of the six tubercles which form the pinna, rather than from the branchial cleft. Excision and curettage are advised.

The condition is of some interest to dermatologists, as the "cyst" responsible for the pre-auricular ulcer or granuloma may easily escape notice.

I.—H. S., a girl, aged 6, has had a granuloma in front of the left ear for one year. She had a long course of intensive local ultra-violet treatment before coming to St. Bartholomew's Hospital. A biopsy excluded lupus, and showed the histological structure of a pyogenic granuloma. The lesion was thoroughly scraped but at once recurred.



H. S. Pre-auricular fistula. Bristle in aperture in root of helix.

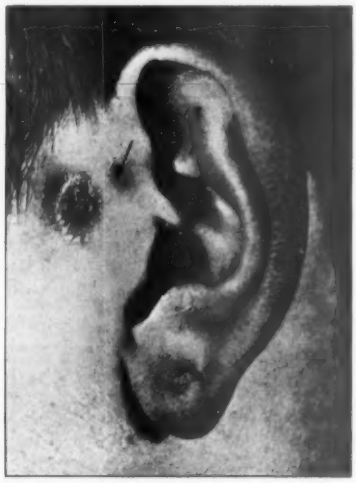
It was then discovered that a minute depression at the root of the helix gave access to an infected "cyst," with a fistulous tract passing under the granuloma. The infection of this cyst has clearly been responsible for the origin and persistence of the granuloma.

Bacteriology (Dr. L. P. Garrod). — Films show numerous bacteria of three principal types, small Gram-positive cocci, short Gram-negative bacilli, and fusiform Gram-negative bacilli. Cultures yield a growth of *Streptococcus salivarius* and *Pfeiffer's bacillus.*

Dr. Garrod concludes that the bacteriology of this material suggests infection from the mouth or pharynx.

The child's paternal grandfather is said to have similar, though larger, depressions in the same position on both ears, but these have occasioned no inconvenience.

II.—W. M., a boy aged 16, has had since birth a small swelling on the helix, just above the external meatus. Ten years ago, following an attack of measles, the swelling became more marked (presumably by infection) and an operation was performed immediately in front of this area. This has left a shallow ulcer with



W. M. Pre-auricular fistula, with secondary ulceration. Bristle in aperture in root of helix.

undermined edges and a granulomatous base, which has persisted ever since. It communicates by a narrow fistulous channel with what appears to be an infected cyst in exactly the same position as in Case I.

As in that case, there is also a small dimple in the corresponding position on the opposite ear.

References.—STAMMERS, *Brit. Journ. Surg.*, 1926, xiv, 359; MONTGOMERY, *Surg. Clin. N. Amer.*, 1931, ii, 141.

Two Cases of Tricho-epitheliomata with a "Rodent" Lesion.—ROBERT KLABER, M.D.

These two cases both show the multiple small nodules on the lower eyelids and other parts of the face described as "tricho-epitheliomata." In each there is, in addition, a rodent-like lesion on the right cheek. One patient has had a full erythema dose of radon applied, but the tumour showed no response.

The histology suggests that the rodent lesions and the tricho-epitheliomata have a common origin.

In neither case is there any family history of any similar condition. These small so-called tricho-epitheliomata are, however, very much more common and seem to be less frequently familial than is the case in epithelioma adenoides

cysticum. Histologically, however, there is close resemblance, and it seems possible that they represent a forme fruste of the latter disease, in which there is more marked epithelial proliferation.

I.—Mrs. A. C., aged 53, for many years has had several small, whitish, flat-topped nodules on the eyelids. These have the clinical and histological appearances of tricho-epithelioma.

Two and a half years ago the patient first noticed a small flat plaque on the right naso-labial fold. Six months ago she was first seen at St. Bartholomew's Hospital, and then showed a hard, white, waxy disc, with overlying telangiectasis. This was regarded as a "rodent" and two radon seeds were applied, estimated to give a dosage of 100 mgm. hours per sq. cm. of area. Erythema occurred but the growth has remained otherwise unaffected; its size is exactly the same.

The section shown indicates its origin from a so-called tricho-epithelioma.

Report on microscopical sections.—(1) Nodule on eyelid shows in the corium epithelial strands, nests, and small cysts, filled with amorphous material, the whole suggesting a folliculo-sebaceous origin. (2) Tumour on cheeks shows in the corium less cyst-formation and more epithelial proliferation, but the appearances suggest the same origin as the nodule from the eyelid.

II.—Mrs. F. L. is aged 61. For as long as she can remember she has had nodules scattered over the lower eyelids and cheeks. They are smooth and of normal skin colour or slightly yellow. A few show a short central horny plug.

Thirty-three years ago she had a rodent ulcer excised from the right upper cheek. Ten months ago a rodent-like lesion appeared on her right lower cheek.

Report on microscopical sections.—(1) Section from nodule on eyelid shows in the corium, for the most part, dense compact masses of basal cells, but a few tubular elements and two cysts, filled with amorphous material, are present. (2) Section from tumour on cheek shows in the corium, arborescent basal cell-masses, surrounded by fine, cellular, fibrous tissue. The appearances differ only in degree from those of the eyelid nodule, and are consistent with a follicular origin.

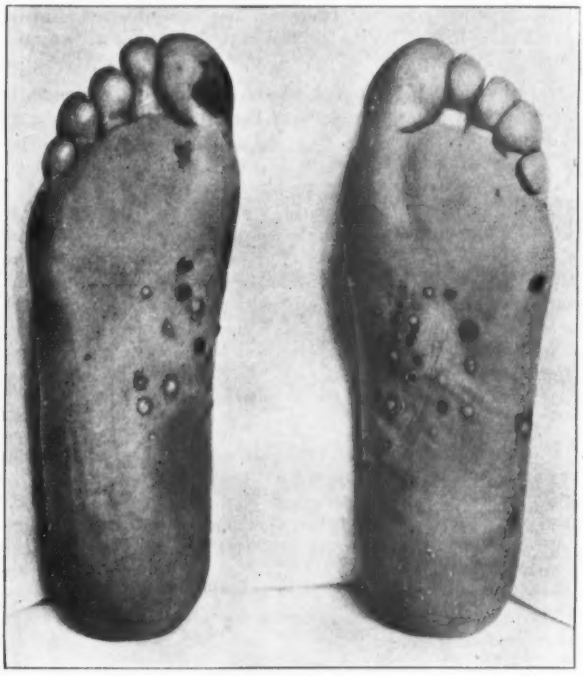
Discussion.—Dr. DOWLING said that all members were doubtless familiar with the flat lesions of the lower eyelids which were quite common and which were well described and illustrated in Darier's "Précis de Dermatologie" (p. 862) under the heading of hydradenoma or syringocystadenoma. Might not the cystic lesions of Dr. Klaber's sections be derived from sweat-glands or ducts rather than from pilosebaceous follicles?

Dr. MUENDE agreed with Dr. Dowling. He thought the first of these two cases was one not of tricho-epithelioma but of "hydradénome éruptif" of Darier. The histology of the two conditions was quite distinct, for in the latter the dilated spaces were lined by two layers of epithelial cells, the inner of which were regular, flattened cuboidal cells with clear, faintly staining cytoplasm. The structure resembled dilated sweat-ducts very closely. In tricho-epithelioma, however, the tubular structure had very thick walls, the cells of which had a marked tendency to keratinize towards the centre, the whole being strongly suggestive of taking its origin from the hair follicle.

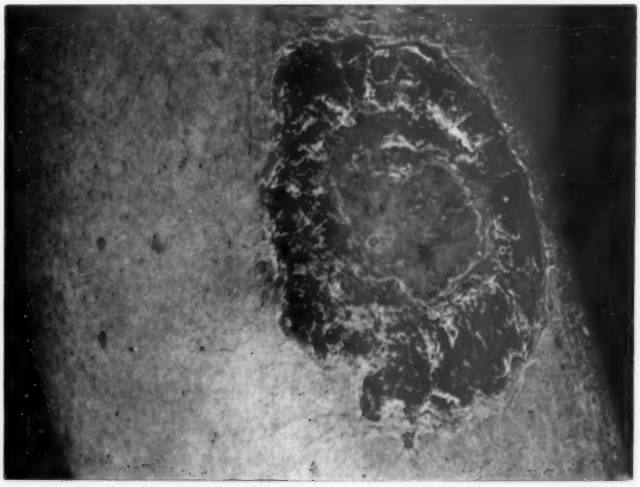
Dr. KLABER (in reply) said that during the last few months he had examined microscopical sections from six cases of so-called tricho-epithelioma, and in all of them the histological structure had resembled more or less closely that of the sections now shown. These suggested an origin in primitive hair-follicle and sebaceous-gland elements. He thought that the glandular eosinophil cells referred to by Dr. Muende represented primitive sebaceous epithelium, rather than sweat-gland derivatives. He agreed that hydradenoma showed a close histological relationship, but he thought that this term might be better reserved for conditions in which lesions were scattered over the trunk.

Psoriasis Pustulosa.—ROBERT KLABER, M.D.

This patient has had for ten years an eruption on the soles of the feet (fig. 1, p. 80) which shows the classical appearances of acro-dermatitis perstans. For the last two months he has had on the right leg a large circinate scaly lesion which is clearly a circinate psoriasis (fig. 2).



Psoriasis pustulosa.



Psoriasis pustulosa (on leg).

Brooke's Tumour with Secondary Intra-epidermal Epithelioma.—HUGH GORDON, M.R.C.P.

The patient, a man, aged 57, has lived in South Africa for the greater part of his life.

History.—He has suffered from psoriasis slightly for many years. Arsenic was taken for some time many years ago. Recently the psoriasis has given very little trouble. About one year ago a swelling appeared above the left eye and was removed under local anæsthesia; it was said to be a "cyst." Although healing occurred a swelling has remained ever since and has gradually increased in size. During the last three months a small area of ulceration has occurred at the top edge of the tumour.

On examination.—A slightly raised, hard, infiltrated area, about 2 in. in diameter, is situated on the outer side of the left eyebrow. It extends up on to the forehead, fading into normal skin, and down on to the zygoma where the raised border is very apparent. The whole area is adherent to the deeper structures and is slightly anæsthetic.

The Wassermann reaction is negative.

Histological report (Dr. R. Klaber).—Sections 1 and 2, taken from the granulomatous area at the top of the lesion: The epithelium shows superficial erosions. There is well-marked epithelial hyperplasia which in several areas shows metaplastic changes, indicative of intra-epidermal epithelioma. The corium shows a dense cellular infiltrate, in which plasma cells and lymphocytes predominate.

Section 3, from lower portion: The section is cut obliquely and does not show its epithelial covering. The corium shows small deeply stained basal-celled masses and cystic spaces lined by flattened epithelium.

Opinion: Intra-epidermal epithelioma arising in connexion with the so-called epithelioma adenoides cysticum (Brooke).

Discussion.—Dr. GORDON: The original diagnosis which suggested itself was a tertiary lesion. There has been a good deal of improvement after six weeks of mercury and potassium iodide given by the mouth. However, in view of the pathological report, I have shown the case for suggestions as to treatment. One must, I think, regard the condition as potentially malignant, and I wondered whether radium or X-ray treatment was the better method.

Dr. A. M. H. GRAY said he thought that the most satisfactory treatment would be surgical diathermy.

Lesions on Face. ? Artefacts: Case for Diagnosis.—HUGH GORDON, M.R.C.P.

The patient, a woman, aged 49, was for many years a sufferer from very severe supra-orbital neuralgia. Injections into the foramen were tried without result, and finally, fifteen years ago, an operation was performed, in India, when the greater portion of the supra-orbital nerve on both sides was either removed or divided. After ten years, sensation was stated to return to some extent. About the same time, i.e. five years ago, "sores" appeared on the forehead. These appeared to extend along the supra-orbital ridges on both sides. They have continued to appear ever since. About eighteen months ago similar places appeared on the left cheek (? after treatment of a mole in the vicinity by carbon-dioxide snow).

On examination.—There are about eight circular, scaly patches scattered over the left cheek, chin and forehead. Their average size is about 1 cm.

They begin as definite lumps in the skin over which a superficial erosion rapidly forms. No pus or discharge is produced. The places remain scaly and slightly indurated for about a month, and then fade away leaving practically no scar. The faint remains of two or three lesions can be seen. Subjective symptoms are slight.

The Wassermann reaction is negative.

The patient is convinced that degenerated nerve substance is being extruded from the places on the forehead, and the remains of the mole from the places on the right

cheek. She states that she does not finger them herself; her history and bearing, however, suggest the probability of the lesions being artefacts.

The clinical picture is, to me, particularly interesting, as I have seen two exactly similar cases during the last three months. Both the other patients stated that they were unable to keep their fingers from the lesions. One of them had a definite psychosis—he was convinced that small worms were coming out of the soles of his feet—the other was apparently a perfectly normal woman mentally.

Discussion.—Dr. BARBER said that he considered the lesion to be a neurotic excoriation, and thought that Dr. Gordon had rightly raised the question of the patient's psychological constitution. Some such cases were obviously neurotic, others were not; in some it was a matter of habit, and the patient might be only partially conscious of what he was doing to himself.

Dr. DOWLING said he agreed with Dr. Barber's remarks. He thought that the appearances were quite typical. The face was always the site chosen. In contrast to cases of true artefact these patients usually admitted fingering the lesions, but said they could not help it. They generally stated that there was a preceding lesion which they felt they must dig out.

Dr. J. H. SEQUEIRA agreed with the diagnosis. He had known a case in which the artefact nature of the affection had been proved by occlusive dressings. He had seen the patient again several years later when she was a candidate for admission as a probationer-nurse, and he had advised that she should not be accepted.

Dr. A. M. H. GRAY said he agreed that the diagnosis given was the most likely, but he did not think the condition was typical excoriated acne. A point which struck him was that the lesions were so round and disc-like—an unusual feature of neurotic excoriations. The latter were more irregular and typical of scratching.

Summer Prurigo (Hutchinson).—ELIZABETH HUNT, M.D.

J.W., a boy aged 6, has had an eruption on his face for six weeks. The eruption is varied in character, consisting at first of pinhead-sized wheals, then of papules, vesicles and occasional bullæ. The lesions are sparsely scattered over the face, especially the cheeks and nose, and on both surfaces of the ears. They remain discrete and as they become older they form into scales which, on falling off, leave little pitted scars.

During the last two days a few papular lesions have appeared on the forearm, since the child has been playing out-of-doors in the sunshine in a short-sleeved shirt. There is marked itching. No previous history of a similar eruption was obtainable.

The general condition of the child is poor. From November 1934 to May 1935 he was in hospital suffering from acute rheumatism; he was then transferred to a fever hospital, with nasal diphtheria.

The tonsils are enlarged and unhealthy and the cervical glands are enlarged. The chest is malformed. No abnormality in heart or lungs was detected on physical examination.

It may perhaps be queried whether the development of sensitization to light has been influenced in this case by treatment for diphtheria.

Pityriasis Versicolor Tropicalis.—Sir ALDO CASTELLANI, K.C.M.G.(Hon)., M.D.

The patient, a young Indian doctor, shows a typical example of pityriasis versicolor tropicalis, known also as tinea flava. The condition is recognized by the presence of yellowish or whitish patches, usually on the face, neck, arms and legs. In this case they are on the forearms and hands. Scrapings from these patches yield a large amount of fungus, which, morphologically, cannot be distinguished from the fungus of pityriasis versicolor of temperate climes. The condition, however, differs from pityriasis versicolor of the temperate zone in the following points: (1) It begins generally in childhood and lasts during the whole of life. (2) It affects, usually, the exposed parts of the body. (3) The treatment is very difficult. (4) The fungus seems to have a marked de-pigmentary action. By strong antimycotic lotions and ointments it can be destroyed, but the patches will remain white or yellow for months—perhaps for years.

Section of Surgery

SUB-SECTION OF PROCTOLOGY

President—W. ERNEST MILES, F.R.C.S.

[*May* 8, 1935]

DISCUSSION ON THE CONSERVATIVE SURGERY OF CARCINOMA OF THE RECTUM

Professor G. Grey Turner.—I wish to make it clear that in dealing with cancer of the rectum I have never advocated conservative surgery to the exclusion of other methods, for in the great majority of cases the more extensive operations hold out the only hope of success. Conservative methods should only be considered when the history is of short duration. The growth should not be larger than a florin and of the papillomatous variety, freely movable with the mucous membrane and when the patient strains, and, of course, there must be no suspicion of dissemination. With these limitations, it will be realized that conservative methods have only a very small field of usefulness and, though I have always been interested in this subject and been on the look out for suitable cases, those I have been able to deal with in this way represent less than 5% of all the cases of cancer of the rectum which I have thought it proper to submit to radical removal. Nevertheless, since there is some scope for these operations, the possibilities and technical details ought to be discussed by this Sub-Section. At the same time I question the wisdom of allowing the discussion to go beyond the domestic circle, so to speak, as I am always afraid that some may be tempted to carry out the conservative operation in unsuitable cases and with possibly disastrous results which will bring discredit on a valuable procedure. When the operation can be successfully carried out the advantages are enormous, for the preservation of the wonderful sphincteric mechanism which guards the anus is worth infinite trouble. Of course, every surgeon knows that patients with an incontinent anus, wherever situated, may be most comfortable, for in due course they acquire a habit which enables them to be reasonably confident and happy, but there can never be true voluntary control and the shocking accidents against decency which may occur are often very distressing to sensitive folk.

As our President has so often insisted, operations for cancer must be founded on our knowledge of pathology, and in spite of what we may occasionally find, the usual course is for cancer of the rectum to spread by local extension and by lymphatic invasion, probably from gland to gland. In our operations the guiding principle must always be to remove the whole of the affected part, with a wide area of healthy tissue, and the path of probable malignant invasion. This may appear too ambitious a programme to be carried out by any operation which preserves the sphincters, but there is probably a stage in all epithelial growths at which it is entirely feasible, and this is proved by the occasional success of limited operations, and by the series of cases which I am able to bring to your notice this evening.

It is over thirty years since my first operation for malignant disease of the rectum. The excision was a purely local affair, but the patient is still alive, with no suspicion of recurrence. In 1903 or thereabouts, I first saw a conservative operation performed by my colleague, the late Mr. H. B. Angus, of Newcastle-upon-Tyne. It was a limited cuff-resection, after the method of Bardenheur. That operation was not successful, but from it I got the idea that a technique rather less limited than the one employed, but less extensive than the radical operations then in vogue, might give satisfactory results. The conservative resection which I have usually practised is really a cuff-resection of the rectum, with restoration of

the continuity of the bowel. This operation is carried out from a posterior incision extending from about the middle of the sacrum to the back of the anus. The posterior raphé of the levatores ani muscles is then divided in the middle line until the rectum is exposed inside its muscular bed. The rectum, with the whole of its surrounding pararectal tissues, is completely separated by blunt dissection until the inner surface of the levatores ani muscles are left quite bare. This separation is carried out downwards as far as the upper border of the internal sphincter and upwards as far as the disease demands. In most cases this has meant opening the recto-vesical pouch or Douglas's pouch, and dividing the bowel two or even three inches above this point. After the necessary amount has been removed the ends are approximated, and an anastomosis by direct suture is carried out.

In every case it has been possible to get the ends into apposition without tension, but this results in straightening out the rectum so that it passes directly downwards from the pouch of Douglas, or recto-vesical pouch, towards the anus, instead of following the curve of the sacrum and coccyx. This straightening of the last bowel is very well shown by skiagrams of opaque enemata, taken some years after the operation.

The suture of the anterior and of the lateral walls is usually easy and satisfactory and by the method employed a certain amount of tissue is turned into the lumen so that when it heals it forms a ring-like shelf on the anterior and lateral walls. The posterior wall, on the other hand, is not tucked-in to the same extent. After the anastomosis is completed the median muscular raphé is carefully drawn together by interrupted sutures. A small drain of rubber tissue is placed inside the levatores and brought from the incision, and a rubber flatus-tube is passed through the anus and is left there for four or five days.

Where the growth is so low that it is impossible to divide the rectum below it and leave a sufficient margin of healthy tissue, the sphincter is divided vertically right through to the anus and the bowel is enucleated from its muscular bed. After adequate mobilization it is brought down and laid in the arms of the open sphincter which is then repaired around its new occupant; the cut margin of the rectum, is then fixed to the skin outside the anus.

I have described and illustrated the technique of these methods in a paper published in *Acta Chirurgica Scandinavica* (1932, lxxii, I-VI), and I feel that there is no need to take up the time of the meeting by going over the same ground. I do, however, want to make it quite clear that it is not a mere removal of the "last bowel" but that the whole of the peri-rectal tissues are ablated, including the fat, cellular tissue and para-rectal glands.

In performing the ordinary radical operation for cancer of the rectum, everything in the true pelvis—except the bladder, with the prostate and vesicles, or the vagina—is removed. In the conservative operation everything inside the levatores is ablated. Preliminary colostomy is not necessary unless there is some obstruction, and such a complication would not usually arise in the type of cases suited for this method. In actual fact, colostomy was carried out six times in nineteen operations. In the cuff-resection the bowel was completely sutured in every case in the first instance; fourteen of the patients developed a fistula of some degree during immediate convalescence, but twelve of these healed within three months. A complication which has always been feared is stricture, but I have not found this to be a difficulty. In my series there were four examples, but only one proved refractory, largely because of the lack of co-operation on the part of the patient; when eventually that was secured the condition was easily dealt with and controlled. I feel I can best indicate the usefulness of this operation by relating something of my own experience of it, and the main points of my cases are set out in the accompanying table. It will be seen that I have carried out the posterior conservative operation on nineteen occasions. To my regret I have to record one death directly due to the operation. The conditions were most favourable—a limited growth of the papillomatous type

Epitome of 19 Cases

Case No.	Initials	Sex	Age	Colostomy	Site of anastomosis	Fæcal fistula	Closure of colostomy	Recurrence	Condition of sphincter	Stricture	Remarks
1	F. H.	F.	39	Yes	Above sphincter	Slight	32 days later	Not malignant; specific	Perfect	None	Perfect functional result. Died of cerebral gumma 2 years later.
2	H. P.	M.	55	None	Above sphincter	Yes, about 3 months	—	None. 15½ years	Perfect	None	Perfect functional result. 4 years ago carcinoma of hepatic flexure removed with end-to-end union.
3	E S.	F.	48	Yes	Above sphincter	Yes, never quite healed	4 months	Died with dissemination at 2 years 8 months	Good	Slight	Local condition fairly satisfactory.
4	S. B.	F.	44	Yes	Above sphincter	None	4 weeks	None. 13 years	Perfect	None	Perfect functional result.
5	J. O.	M.	67	None	Above sphincter	Yes	See remarks	None at time of sudden death 2 years 10 months later	Good	Slight	A very nervous man who would not tolerate local treatment. On that account colostomy necessary 3 months after operation.
6	H. O.	M.	26	None	Above sphincter	Yes, 7 weeks	—	None. 9 years	Perfect	None	Perfect functional result.
7	A. W.	F.	74	None	Anal canal. Sphincter divided vertically	Yes, 8 weeks	—	None. 8 years 4 months	Good	None	Very satisfactory result. Died in her sleep in her 82nd year.
8	T. D.	M.	63	Yes	Above sphincter	Yes, 8 weeks	3 months	None. 8 years 5 months	Perfect	None	Very satisfactory result. Patient the subject of diabetes.
9	T. K.	M.	45	Yes	Above sphincter	Yes, 8 weeks	6 weeks	None. 8 years 2 months	Perfect	None	Perfect functional result. Died of acute bronchitis.
10	F. W.	M.	55	None	Above sphincter	Yes, 6 months	—	None. 8 years	Perfect	Slight	A nervous man addicted to morphia. Uses bougie which is not really necessary.
11	T. K.	M.	63	None	Anal canal. Sphincter divided vertically	Yes, 2 months	—	Large papilloma. Not malignant	Good	None	Very satisfactory result 4 years and 8 months later.
12	C. D.	M.	64	None	Above sphincter	Only a day or two	—	Large papilloma. Not malignant	Perfect	None	Perfect functional result 4 years later.
13	J. R.	M.	51	Yes	Anal canal. Sphincter divided vertically	No	3 months	Metastases in liver. Death 14 months later	Good	Slight, at anus	Some suggestion of small local recurrence.
14	G. J.	M.	53	None	Anal canal. Sphincter divided vertically	Yes, about 10 months	See remarks	Died with dissemination 6 years after operation	Good	None	Temporary colostomy 4 months after operation to assist closure of fistula.
15	M. H.	F.	56	None	Above sphincter	No	—	Dissemination. Died 2 years later	Perfect	None	Good local result.
16	J. B.	M.	45	None	Above sphincter	Yes	—	Recurrence. Died 14 months later	Good	None	Local recurrence and dissemination.
17	C. F.	M.	44	None	Anal canal. Sphincter divided vertically	Yes, slight	—	Recurrence, 5 months	Patulous and incontinent	None	Sarcoma. Early recurrence, locally and in liver.
18	—	F.	63	None	Above sphincter	Yes	—	Died of operation	—	—	Renal insufficiency.
19	C. W.	M.	59	None	Sphincter divided vertically	No	—	Recent case	Good	None	Good immediate recovery.

in the ampulla with no suspicion of dissemination—but the patient was over 60, not in good general health, and very adverse to operative interference of any sort whatever. Renal insufficiency undoubtedly contributed to her end. Another patient has been operated upon too recently to justify comment, and three cases were not malignant. Of the remaining fourteen patients, six died of recurrence within three years, three died without evidence of recurrence, after more than eight years in two cases, and after three years in the third. There are five patients alive and perfectly well after 15½, 13, 9, 8½ and 8 years respectively. All these patients have good rectal function and control. Many members of this Sub-Section have seen some of these patients, and have had an opportunity of examining the pathological specimens. The circumstances of the first three of these cases are worth briefly recording.

The first patient was 55 years of age at the time of operation; he made a slow but complete recovery, with a perfect functional result. Four years ago he was not so well and began to fear that the growth had recurred. On investigation it was found that his symptoms were due to a constricting carcinoma of the hepatic flexure. This was excised and the continuity of the bowel restored, and now, fifteen and a half years since the first operation, the patient is as well as ever.

The second patient, a woman, aged 44 at the time of operation, had rather a larger growth, and I agreed with a colleague who advised that she should have a full perineal excision, with a permanent colostomy. As her determination to face death rather than colostomy was born of the experience of that operation in a near relative, I agreed to carry out the conservative method and now, thirteen years later, she remains well with perfect rectal function and control.

The third case was that of a young man aged only 26. As, in my experience, operations for carcinoma of the rectum, however heroic, in persons under 30 are usually followed by recurrence, I thought that this patient might as well have the advantage of the preservation of the sphincters until the inevitable recurrence should overtake him. To my delight he remains alive and perfectly well now nine years after operation.

The details of several of the other cases are similarly interesting as, for instance, that of an old lady who faced the operation at 74 years of age and lived in great comfort until she died in her sleep, eight years and four months afterwards. Another patient, a diabetic of several years' standing, survived the operation in two stages and was rewarded by a very satisfactory functional result which has stood him in good stead for more than eight years.

The immediate convalescence of these patients rarely gives rise to anxiety and the results as regards function are very satisfactory. In the paper above referred to full details of the after-results are given; suffice it to say that out of seventeen cases sphincter control was adequate in all but one, and that was a case in which early recurrence of a sarcoma occurred. The other patients could retain flatus and were continent in the presence of diarrhœa.

Incidentally I may say that this operation of cuff-resection is admirably suited for large papillomata and for some types of fibrous stricture.

I want also to speak of an upper conservative operation, that is to say one in which the procedure is entirely carried out through the abdomen. Many years ago, I was much impressed by a case in which I removed the pelvic colon which was obstructed by a carcinoma in its lowest part. The lower limit of section was flush with the bottom of the recto-vesical pouch and there was a very small margin of healthy bowel below the growth. The question of anastomosis was never considered and the rectal end was completely closed, and the upper end brought out as a permanent colostomy. To my astonishment this man lived for seven years when he died of what were probably secondary growths in the liver. Several similar experiences have led me to consider the possibility of an upper conservative operation and this I have now carried out on several occasions. The only indications germane to this discussion are those cases in which there is a growth high in the rectum or at the pelvi-rectal junction. Ordinarily abdomino-perineal or perineo-abdominal operations would be the only methods to be considered but in these operations it

always saddens me to have to sacrifice the perfectly healthy rectum with its wonderful neuro-muscular mechanism.

The upper conservative operation is only carried out after preliminary exploration and colostomy. With a mid-line incision and the patient in the high Trendelenburg posture, the location of the growth is defined and is encircled by an incision designed to cut out the whole of the bottom of the recto-vesical pouch. When the cellular tissue is exposed, separation is carried out as far from the bowel as possible, just inside the levatores ani, and almost as low down as the pelvic diaphragm. This step is facilitated by the separation of the bowel from the front of the sacrum. By this means a sufficient margin of bowel below and above the growth—together with the peri-rectal tissue, the meso-rectum, and the pelvic meso-colon—can be removed. End-to-end union by direct suture is then made; this step is difficult but the presence of the functioning colostomy and the drainage per rectum, make it reasonably safe. As an additional precaution a rubber tissue drain is placed in the neighbourhood of the anastomosis and brought out through the lower part of the abdominal incision. After some weeks the temporary colostomy is closed. In a small series of cases the results, both immediate and remote, have been very satisfactory and I am encouraged to continue to use this method when opportunity offers.

Coming from Newcastle-upon-Tyne, I am naturally interested in the intussusception method over a rubber tube which was first described by my great teacher, Professor Rutherford Morison, thirty-five years ago. That method, however, did not fulfil the promise which its ingenuity deserved, and I think it has now been abandoned. My friend, Mr. Rayner, is to speak of the pull-through method which was also introduced many years ago, but has now received a further impetus by the work of Professor Sebrechts, of Bruges, in whose hands the operation has been very successful.

To justify conservative operations for cancer, we must get the patients at an early stage. A keener appreciation of the frequency of malignant disease of the rectum, an earlier resort to ordinary rectal examination by the practitioners who first see the patients, and the more frequent use of the sigmoidoscope, will, let us hope, result in many cases being discovered at a stage at which these conservative methods may at least properly be considered.

Mr. H. H. Rayner said he would devote his remarks to the conservative operation for high carcinoma of the rectum—carcinoma in the upper third of the rectum below the pelvi-rectal junction and easily accessible to the finger on simple digital examination—and conservative only in the sense that the sphincteric mechanism of the anal canal was preserved for the restoration of a functioning anus. If such an operation could be shown to be sound in its comparative freedom from immediate risk and in its ability to give the patient a prospect of ultimate survival as good as that afforded by either of the established operations, then this operation would represent a considerable advance in the treatment of a large proportion of patients suffering from rectal carcinoma; for it would be agreed that the upper end of the rectum was a very common position for the development of growths in that viscus. It was unnecessary to point out the immense advantage to the patient, who would consequently be persuaded at the first consultation with much less difficulty than hitherto, to undergo the operation. If it was legitimate, in a surgical sense, to perform a perineal excision of the rectum, with its necessarily restricted removal of bowel and mesenteric tissues above the growth, for ordinary ampullary carcinoma, was it not also legitimate when removing the rectum for high carcinoma to preserve the musculature of the anal canal so as to secure for the patient the benefit of a continent anus? Probably the risk to life of such an operation was appreciably higher than that of the purely perineal operation, but for cancer in this position the risk must be compared with that of the abdomino-perineal operation. For carcinoma at or just above the pelvi-rectal junction it was permissible to leave the anus intact

in the performance of the so-called anterior resection of the rectum (Rankin's designation) an extravagant operation in that it left the patient with an intact but functionless anal canal—and one only to be justified on grounds of expediency. The conservative operation, with its restoration of a functioning anus, would serve admirably, under favourable conditions, in this type of growth; he had used it with success in two such cases. His own experience of this conservative operation, as performed for intrinsic carcinoma of the rectum, was small, and did not justify him in more than introducing it to the notice of those who did not already know it, as worthy of a trial in favourable cases.

The operation was that which had been performed by Professor Sebrechts of Bruges for several years past and with which no doubt many present were familiar. The operation had two stages both necessarily performed at the same sitting. The first stage proceeded exactly as did the abdominal stage of the abdomino-perineal operation with this fundamental difference—the pelvic colon was not divided but instead a suitable point on it was selected for later implantation at the anal orifice; this point was generally in the lower third of the pelvic colon. In selecting this point care had to be taken to see (*a*) that the colon above was sufficiently long and mobile to allow of the point being brought down to the anus without tension and (*b*), by inspection of the vessels in the mesentery, that the blood supply of the future anus was assured. The mesocolon was then divided at this point from the bowel to its root—the superior hæmorrhoidal vessels being cut across between ligatures. The rectum was freed on all sides below the pelvic peritoneum *just as thoroughly* as in the abdomino-perineal operation, in order to make the second stage easy. This done, the rectum and lower colon were crowded into the bottom of the pelvis, the peritoneal floor of which was reconstructed, but a gap in its centre remained through which passed the lower pelvic colon; the edges of this peritoneal gap were sutured to a point on the pelvic colon as high as possible above the part selected for the new anal orifice. The abdomen was now closed without drainage and the patient put into a tilted lithotomy position. The lower rectum was washed out by an assistant to clear it of débris which would have accumulated owing to the previous manipulations, and was firmly packed with gauze; the anal orifice was then closed by a purse-string suture, the ends of which were left long for traction. Then a circular cut was made around the anal orifice at the muco-cutaneous junction and the mucous membrane of the anal canal was dissected up as a cylinder, just as in Whitehead's operation, to a height of about 1½ in. to 2 in., i.e. to the level of the ano-rectal ring. Care was necessary to prevent buttonholing the mucous membrane, and hence the necessity for preliminary cleansing of the rectum in the event of this occurrence. The level of the ano-rectal ring—which could be recognized by palpation—having been reached, a cut backwards at this level and in the mid-line was made through the muscular walls of the rectum, until the subperitoneal space of the pelvic cavity was entered, and in this way communication with the previous field of operation established. With the left forefinger in this large space it was now easy, if the first part of the operation had been thoroughly done, to divide the structures still holding the rectum laterally and in front—laterally some part of the levatores were divided but not the whole thickness of these muscles; as soon as the lower rectum had been freed the bowel was drawn down through the sphincters (it was remarkable what a roomy opening in the perineum resulted from this dissection); the point on the pelvic colon selected for the anal orifice was recognized and there the colon was divided by cautery between two fine-bladed clamps, thus completing the removal of the diseased bowel. A counter opening was made to one side of the coccyx for the introduction of a drainage tube into the pelvic cavity below the peritoneal floor. The cauterized upper end of the colon, still grasped by its clamp, was brought down to the anal site and was there fixed in position by a series of mattress sutures which passed through the skin and the wall of the bowel above the clamp. Finally the clamp was removed and exact coaptation of mucous membrane to skin edge secured by a few interrupted sutures.

He had performed this operation for intrinsic carcinoma of the rectum on four patients, one of whom had died as the result of the operation; this was a woman aged 66 on whom he had operated by invitation at a strange hospital and therefore in unaccustomed surroundings.

The other three patients had made good recoveries; one, a man, had died twenty months later of true bulbar paralysis, without any signs of metastases or local recurrence when examined three months before death. He had, during the first year after his operation, fair—but not normal—control of defæcation. Of the other two—both women—one was in very good health nearly three years after her operation, had gained 2 st. in weight, and had according to her own statement perfectly normal control of bowel actions and expulsion of flatus; she began to regain this control within a few weeks of her operation. This patient had an annular carcinoma in the upper rectum, with metastases in at least two glands in the meso-rectum. [A sketch of the specimen, made immediately after the operation, was shown and recent photographs of the anus and of the patient were also exhibited.]

The other patient was now, to all appearance, in very good health eight months after her operation, and had in that time gained 9 lb. in weight. She stated that she had normal control of bowel action and passage of flatus. She had a massive carcinoma of the rectum, with extensive metastases of the lymph-glands in the meso-rectum, and adhesion of a coil of small intestine to the peritoneal surface of the rectum at the site of the growth, necessitating removal of an ellipse of small intestine with the rectum. The ultimate prognosis was therefore bad, but it was open to doubt if this had been made any worse by conservation of the sphincters.

With regard to preliminary colostomy: On each patient he had performed a preliminary colostomy through the left end of the transverse colon, and an effective spur had been made by suture of the skin-wound between the two limbs of the bowel and, later, complete division of the bowel in front of this spur. In this way the fæcal stream was entirely diverted from the distal colon. This colostomy was closed some three or four weeks after resection of the rectum, first by crushing the spur with an enterotome, and a little later by extraperitoneal closure of the fæcal fistula.

Mr. W. B. Gabriel: I think we shall all agree that the only cases for which this operation could possibly be considered suitable are those which fall into Group A of Dukes' classification, i.e. those in which the growth has not yet penetrated the rectal wall.

The rarity of this group is well shown in the following table, which is compiled from the *Surgical Reports of St. Mark's Hospital* for the years 1932-1934.

Year	No. of new cases of cancer of the rectum treated by radical operation	No. of A cases
1932	38	6
1933	44	4
1934	60	6
Total	142	16

This shows that only 11% *of the operable cases* were proved to be in the early group, and the present discussion relates to the propriety of treating these cases by a conservative excision. With the exception of those unusual instances in which a colostomy is resolutely refused, or when there is some special reason, such as the patient's mental condition or economic position, which makes it imperative to avoid a colostomy, I am opposed to treating these cases by a conservative resection for the following reasons:—

(1) The frequent occurrence of double carcinomata or associated polypi. If a combined excision is done for A cases the surgeon can rest assured that he has completely rid the patient of an early malignant tumour, and that he has done his best for the patient, by removing the entire rectum and pelvic colon, to minimize the

risk of another cancer developing later. As a case in point I show a specimen removed last week. The patient is a fit man aged 75: he presented an early mobile cancer in the ampulla of the rectum; a fragment removed by Brünings' forceps proved it to be a columnar-celled carcinoma. I debated for several days as to which operation should be performed, and finally decided that the risk of a conservative resection was not counterbalanced by the advantages. After due preparation I carried out in one stage a perineo-abdominal excision of the rectum as a blind operation from below. The patient has made a splendid recovery. The specimen, measuring 17 in., presents a small protuberant growth in the rectal ampulla which will certainly be classified as an A case; but in addition I have another interesting trophy to exhibit from this same patient, for on the second post-operative day I found this polyp, $\frac{3}{4}$ in. in diameter, extruded from the left iliac colostomy; its removal by crushing and ligature of the pedicle has been a simple matter. In this case, therefore, the radical operation has completely rid the patient of an early rectal cancer, and has also afforded the opportunity of removing this polyp which is undoubtedly a cellular adenoma in the pre-cancerous state—it is already slightly ulcerated on its surface.

(2) Conservative resection of the rectum is a difficult operation, because the entire circumference of the rectum must be mobilized. If the growth is either very high up or very low down it may be difficult to make a good anastomosis, and apart from the risk of local recurrence if the margin of normal tissue is too small, there is the risk of fistula formation and of stricture. I should imagine that satisfactory healing at the suture-line is likely to be better in young subjects than in the aged.

(3) A third objection is the difficulty of assessing clinically whether any particular growth is really confined within the rectal wall, or whether it has extended through into the extra-rectal tissues, with risk of glandular infection being present. To illustrate the danger of conservative resection in such a case I am showing a specimen removed by perineo-abdominal excision from a little woman, aged 70; there is a small, flat, semi-ulcerated growth, $1\frac{1}{2}$ in. in diameter, in the lower third of the rectum. Dr. Dukes reports that it is a colloid carcinoma which has spread to the extra-rectal tissues; seven lymphatic glands above the growth are free from metastases, but secondary deposits of carcinoma are present in the highest gland removed 6 in. above the growth. The patient is alive and well, fourteen months later. Admittedly this type of irregular spread is rare, but it is, I think, fair to quote this case as an argument against conservative resection.

The following are the only two cases in which I have performed conservative resection [specimens shown]:—

I.—The specimen is a small protuberant growth measuring $1\frac{1}{2} \times 1$ in. from a woman, aged 34. Operation was performed in July 1933; the rectum was mobilized through a posterior incision sparing the sphincters; a suitable length of the rectum, together with the growth, was then made to prolapse through the anus, and the affected segment was excised. The patient is now alive (May 1935), with a natural bowel function, and is free from recurrence. This case may therefore be classed as very successful up to the present.

Pathological report: Adenocarcinoma, "A" case. One rectal gland examined and found free from metastasis.

II.—An extensive recurrent villous tumour growing chiefly on the anterior and lateral walls of the lower rectum, from a stout female, aged 57. No recurrence has taken place to date (two years, nine months).

Sir Charles Gordon-Watson said that he had found the conservative method valuable in cases of large papillomata; in the few cases in which he had employed it for carcinoma he had been unsuccessful in avoiding recurrence and had now abandoned it. However, during the past few years, since Professor Grey Turner had published his results in *Acta Scandinavic* he had been on the look-out for a suitable case in which to give the method a further trial, and so far had failed to find one. He could not help feeling that Professor Grey Turner had a special gift for succeeding in these cases where others failed. He (Sir Charles) thought that the transperitoneal cuff-resection of growths in the region of the recto-sigmoidal

junction must be a risky procedure, and he would always prefer to perform a Hartmann's operation, when that was possible, for growths in this situation. Hartmann's operation was not only an efficient radical operation, but one with a very low mortality rate.

Before the war he (the speaker) had carried out several operations of the type described by Mr. Rayner, and although some of these had been brilliantly successful, the uncertainty of maintaining a satisfactory blood-supply to the part drawn down had led him to abandon the procedure, and the same argument applied to the tube invagination method. Possibly with improvements in technique, &c., since pre-war days this type of operation deserved a further trial.

All methods of conservative resection were prompted by a desire to preserve the sphincters, and it must be admitted that all such methods were less radical than the methods commonly adopted at the present time in combination with a colostomy. He was one of those who considered that a colostomy was not such a hindrance to general comfort as was commonly believed.

Mr. J. P. Lockhart-Mummery said that these methods of dealing with carcinoma by conservative surgery had been practised by himself and others twenty-five years ago, and discarded as unsuitable, but since that time surgery had advanced very considerably in the matter of technique, and such operations could now be performed much more safely and satisfactorily than was then possible. He was sure that many cases of cancer of the rectum could be cured by conservative surgery—the difficulty was to know which. He himself had several patients alive fifteen years after the tumour had been removed by this means, but cases suitable for such treatment were not very common.

With regard to Mr. Rayner's method of bringing the colon down to the anus after removing the rectum, he (the speaker) had practised this on numerous occasions many years ago, and a full description of the operation would be found in his first book on "Diseases of the Rectum" published in 1914. The reason he had discarded it was that it was so frequently followed by gangrene and sloughing of the transplanted bowel, with disastrous results.

Mr. Lionel Norbury said that he had recently performed conservative operations in two cases.

I.—A young girl suffering from a large villous tumour. This was removed by cuff resection, after opening the peritoneum and mobilizing the rectum. A stricture followed and colostomy had to be performed. The rectum was subsequently removed by perineal excision.

II.—A young woman with an ulcerating growth low down in the rectum and on the posterior wall. This was excised locally and the rectum repaired. A fæcal fistula followed but this soon closed spontaneously, with a satisfactory result (specimen shown).

He (Mr. Norbury) considered that there was undoubtedly a field for the operation of conservative resection in selected cases of carcinoma of the rectum, especially in those cases in which the patients refused to have a colostomy.

Dr. Cuthbert Dukes said that there appeared to be two schools of thought amongst rectal surgeons: one which sought to remove more and more, and the other to be content with less and less. Both schools turned to pathology for support for their opinions and there was something encouraging to be said for each. One generalization which might be employed as an argument in favour of local resection was that cancer of the rectum remained a local disease until the growth had spread by direct continuity into the perirectal tissues. Only after this point had been reached, spread took place by lymphatic and venous channels to distant regions, so that probably local resection would be adequate during the "A" stage of the disease.

Another generalization, however, which must be kept in mind was that surgeons usually underestimated the extent of local spread in their preliminary examinations. That was to say, the growth might be shown, by microscopic examination, to have

spread further in most cases than had been thought before operation. Such a consideration as this appeared to be an argument in favour of as extensive a removal as the circumstances would permit.

Mr. Turner Warwick said that he was convinced of the importance of restoring bowel continuity wherever that was possible. He had for some time been attempting to work out a satisfactory and more radical procedure that would preserve the anus in the case of growths in the upper two-thirds of the rectum, but had only progressed so far as to be able to make provisional comments rather than to state definite conclusions.

The arguments that he had heard advanced against it by those contemporary with its former use were: (1) That it was pathologically unsound. (2) That the bowel not infrequently sloughed.

He thought, however, that in the case of high rectal growths the procedure would be found to be sound enough to stand the test of practice, if technical difficulties could be overcome.

With regard to the sloughing, there were two factors; the first was the arterial state of the patient, who was usually advanced in years; and the second was the anatomical arrangement of the arteries of the pelvic loop. In the ordinary textbook description of the pelvic loop both bowel and arteries could be straightened out, once the superior hæmorrhoidal vessels were divided at a suitable point. In practice the main blood supply of this loop not infrequently ran obliquely across the mesentery of the loop, and its division, which was necessary to secure elongation, imperilled the blood supply. This arterial inconstancy also rendered it necessary to begin with the abdominal stage.

If at the end of this stage the bowel seemed to have a good blood supply, it was pushed down and the peritoneum was closed in the floor of the pelvis and around the bowel, about two inches above the site chosen for anal anastomosis. The patient was then turned into the lateral position and the perineal portion of the operation was carried out. If the blood supply of the bowel seemed to be inadequate, the bowel was divided, a terminal colostomy was made, and the operation finished as an abdomino-perineal one.

If the anatomical arrangement of the arterial supply of the pelvic loop was unsuitable, the procedure just described would probably fail, but there appeared to be one other conservative procedure possible—that advocated by Jones, who performed a two-stage operation. The first stage consisted in ligating the inferior mesenteric close to its origin, freeing the splenic flexure, descending colon and rectosigmoid, so arranging them and closing the peritoneum in the pelvis that a second perineal operation could be made a few days later leaving continuity with the anus. Jones maintained that the peripheral arcade was sufficient to ensure the blood supply of the lower bowel, provided the main artery was ligated close to its origin so that no large branches were damaged. Possibly the addition of inferior mesenteric and pelvic sympathectomy would improve the results of this operation on which Jones had reported very favourably.

Mr. Rayner (in reply) said it had been stated that the operation which he had described had been performed many times, as far back as twenty-five years ago, and had been abandoned because of the grave risk of sloughing of the new rectum. The conditions governing surgical work had greatly improved since that date and an operation which had proved to be dangerous then might not be dangerous at the present time. Suprapubic prostatectomy had been performed many years before it had become recognized as a practicable operation. At any rate he had not met with sloughing of the transplanted bowel in his few patients and he was so much impressed with the condition of these patients after recovery that he intended to continue his trial of the operation.

Section of Laryngology

President—W. M. MOLLISON, M.Chir.

[*May 3, 1935, continued.*]

Four Cases of Orbital Cellulitis Secondary to Nasal Disease Treated by Simple Incision.—T. B. LAYTON.

I.—M. D., female, aged 20, developed a headache on January 31, 1933, followed on February 8 by swelling in the region of the right eye, with nasal discharge, and on this day there was a faint rash upon the trunk. On admission to the North-Eastern Fever Hospital on February 8 there were the remnants of a punctate rash, a peeled tongue and desquamation of the neck and trunk. There was bilateral cervical adenitis and a purulent nasal discharge with tenderness on the right side of the nose.

She complained of severe pain in the right eye, there was swelling of the lids, with chemosis which made it hard to estimate whether there was any proptosis, but this was thought to be present. There was limitation of the movements of the eye causing diplopia on looking to the right. The optic discs appeared normal. Her temperature was 101·4° F., and her pulse 120. She was treated with 20 c.c. of antiscarlet serum intramuscularly with fluids *ad lib.*, inhalations of menthol, and fomentations to the eye.

A week later (February 15) the temperature had settled, the nasal discharge was diminishing, and there was less swelling in the region of the right eye. I advised that the expectant treatment should be continued until localization occurred, when a small incision should be made. This was done three days later (February 18) under general anæsthesia, by Dr. Linford, who obtained a little thick pus (hæmolytic streptococcus on cultivation) from a tender area near the inner canthus by an incision into which a small drainage tube was inserted.

On February 22 a skiagram was taken on which Dr. Mitman reported that the right frontal and ethmoidal sinuses and the maxillary antrum showed a uniform opacity. On that day I made a further incision under tutocaine anæsthesia at the inner margin of the orbit, and raised up the periosteum, but found no pus beneath. I am confident that I did no good by this further operative procedure; at the same time I washed out the antrum but found no pus. From the washings was grown a pure culture of the hæmolytic streptococcus. Thereafter the inflammatory signs slowly and rather irregularly subsided; the nasal discharge continued but was less in amount. The hæmolytic streptococcus was still present in this on March 13. The discharge ceased on March 30. On leaving hospital on April 8 no hæmolytic streptococcus could be cultivated from the nose. The patient has been well since.

II.—A similar case of a small boy, aged 9, who, during an attack of scarlet fever had a swelling which was watched for three weeks. When it pointed at the inner part of the orbit Dr. Banks made a small incision into it. The sinusitis was well by the time the boy had recovered from the scarlet fever. He has had no trouble since (two years). The scar is almost invisible.

I have to thank the M.O.H. to the L.C.C. for permission to show these two cases.

III.—Nurse A. had been nursing a student who was dying from hæmolytic streptococcal septicæmia secondary to a prick on his finger. She developed pain on the right side of the face with blockage of the nose on that side, followed by swelling of the eyelids. The chemosis was so marked that the eye could not be seen, and the

whole of the side of the face was swollen. The mucous membrane on the right side of the nose was so swollen that all the neighbouring parts were in contact. There was no true pus. The left side was normal.

It was feared that she already had cavernous sinus thrombosis. She was treated with fluids in large quantities, and menthol inhalations, while the swelling was carefully watched. On the fifth day it was localized in the cheek beneath the inner canthus of the eye. An incision was made under local anæsthesia and a small amount of pus was evacuated. The antrum was washed out. This was painful to the patient and indefinite in its result as only a small amount of blood-stained mucus was recovered. It was probably valueless as a therapeutic measure at this stage. From the washings no hæmolytic streptococcus could be obtained. The staphylococcus that was grown was probably a contamination.

From this time her progress, though slow at first, was uninterrupted. At the end of a month she was sent home for three months' convalescence. It was intended at the end of that time to investigate the sinuses and to deal with any that were affected; but before this time had elapsed she was well. She has remained so in the subsequent three years, having completed her training at Guy's Hospital as a nurse.

IV.—A girl, aged 14, had pus in the nose and an orbital swelling. This pointed over the middle of the left eye. It was incised under local anæsthesia. It reformed and was incised again. A sinus remained. Under local anæsthesia the wound was reopened, the floor of the frontal sinus was removed and drainage secured into the nose as described by Harmer and Bedford Russell. The fronto-nasal duct was thus dilated by increasing sizes of rubber tubing. The patient is now well, but the case is a relatively recent one (six months since recovery).

Discussion.—WALTER HOWARTH considered that these cases pointed the moral—which all should remember—that in acute cases the less surgical intervention which was carried out at the time, the better for the patients, and the less was the risk of setting up osteomyelitis. If just enough was done to evacuate the abscess and provide efficient drainage, the underlying sinusitis could be treated more satisfactorily at a later stage in the case. In many of the cases which showed œdema and apparent cellulitis of the orbit it was not, in his experience, even necessary to make an external incision; he had found that by plugging the nose with adrenaline and cocaine, or protargol and argyrol, one could get a large number of these cases, apparently needing an external incision, to settle down satisfactorily. For many years it had been the routine procedure, in his clinic, to give intranasal applications twice a day in these cases; after which in a large proportion the condition cleared up. That result obtained in ordinary acute frontal sinus cases as well as in cases having some œdema. To rush in and perform large operations in such cases was a practice to be deprecated. He was glad Mr. Layton had brought this series of cases forward, to show what could be done by simple incision, and the after-treatment, a few weeks later, of the underlying sinusitis.

E. D. D. DAVIS said he was very much puzzled by Mr. Layton's cases. They were not cases of orbital cellulitis such as he (the speaker) had seen. There were cases of nasal sinus suppuration with slight œdema of the upper eyelid which would clear up with conservative treatment; like acute suppuration of the mastoid it was a question of degree. But the cases of orbital cellulitis sent to him from an ophthalmic hospital were desperately ill. Temperature 104°; marked proptosis of the eyeball with extensive œdema of the eyelids and conjunctiva. Ninety per cent of these cases were caused by suppuration of the frontal and ethmoidal sinuses. There was a figure-of-eight abscess, a collection of pus in the orbit between the orbital periosteum and the bone and another collection in the ethmoid or frontal sinuses. These cases might be expected to progress to a cavernous sinus thrombosis, pyæmia, meningitis or optic atrophy. They needed urgently adequate drainage of the orbit and nose by operation. He had seen a few cases—fortunately very few—treated by simple incision which was certainly insufficient. In one such case the patient, a boy, died of meningitis in spite of a further operation; the cerebrospinal fluid was found to be turbid before the second operation. In the milder cases with slight œdema it was often difficult to

be sure whether pus was present in the orbit or not. In the severe cases with an abscess in the orbit drainage should be carried out as soon as possible. Simple incision would be inadequate and disastrous.

J. F. O'MALLEY said he could recall varying degrees of severity in children. Sometimes following an attack of scarlet fever there was œdema of the inner canthus, which he interpreted as an infection of the ethmoid cells which had extended into that region. If it was not very severe it subsided after the use of local vaso-constrictors. He was in favour of spraying with 1 : 5,000 adrenaline frequently during the day. He had had two cases in the same family. In one child there was suppuration under the middle turbinate and in the ethmoidal cells, with œdema of both lids. That had subsided perfectly under local treatment. Another child had developed a swelling in the floor of the frontal sinus—a definite external swelling, indicating that there was bone erosion. Simple incision permitted the escape of the discharge, and no need existed later to do anything to the nose. Unless the symptoms were very grave and called for further intervention, the simpler the treatment the better. Much help to drainage was afforded by local aeration of the cavities.

T. B. LAYTON (in reply) said that five years ago he might have spoken to the same effect as Mr. Davis had now done, but to-day he stood before the Section as a "reformed character." Formerly he did heroic operations for these conditions, and if the patient got well he said, "See what a good boy am I," while if he happened to die his comment was, "Well, at any rate, I have done my best." The case that made him change his mind was that of a girl whom he had shown to the Section years ago. She had an abscess in her orbit, and pus was pouring down the middle meatus, and she was so ill that the medical officer would not even carry out the speaker's advice to aspirate the swelling. She was well without anything being done to her by the time she had recovered from her scarlet fever.

He had taken a long time to learn his lesson. His conclusion was that the more desperately ill the patient was, unless there was incipient meningitis, the more was it necessary to leave him alone operatively. He did not think patients were saved from cavernous sinus thrombosis by operating on the acutely inflamed area; indeed, if it was a question of touch-and-go whether the patient would have cavernous sinus thrombosis or not, it was possible to tip the case over to the unfavourable side by operating.

He wished to advocate the method of dilating the fronto-nasal duct after the frontal sinus operation used in Case IV. When Mr. Harmer and Dr. Bedford Russell first described it, he (the speaker) did not believe in it; he asked at that time how pressure of a rubber tube through mucous membrane could cause a bony tube to become bigger. That showed the fallacy of arguing on the ground that a thing could not occur without trying. By putting in increasingly large tubes he did not doubt there was a gradual dilatation of the fronto-nasal duct.

Mr. Davis was wrong when he spoke of a figure-of-eight abscess. Suppuration in the frontal sinus was not an abscess. One might almost as truly say that a common cold was an abscess. It was an inflammation of mucous membrane, the products of which were not escaping properly.

In his "unregenerate days" fifteen years ago he showed a case after a heroic operation had been done, under the influence of Mr. Herbert Tilley, and he subsequently showed the patient as a warning against that procedure. In those days he had two or three cases in which there had been a sequestrum of the os planum of the ethmoid. Since he had followed the policy of "hanging on" such had not occurred.

He was not claiming that by doing this every case would be saved. Years ago he had the case of a boy who had these symptoms, and there was intense injection of the mucous membrane and nothing else. He died of cavernous sinus thrombosis. The inflammation had spread from the ethmoidal mucous membrane to the superior ophthalmic vein, which had become thrombosed. Within the thrombus pus had formed, and this had burst into the orbital fat. The only operation that could have helped in such a case would have been a ligature of the superior ophthalmic vein prior to any symptoms having arisen.

Section of Laryngology and Section of Otology

COMBINED MEETING

HELD AT BRISTOL, JUNE 14 and 15, 1935

[*June* 14, 1935]

LARYNGOLOGICAL SESSION

Chairman : PATRICK WATSON-WILLIAMS, M.D.

Congenital Shortness of the Œsophagus.—A. J. WRIGHT.

K. S., male, aged 6 years.

First seen May 14, 1935, complaining of cough followed by vomiting ; worse at night. The child is undernourished.

Skiagrams show the existence of a portion of the stomach in the thorax.

Suggestions as to future treatment would be welcomed.

Discussion.—W. STIRK ADAMS said that the boy was making good progress, in spite of his difficulty in swallowing, and it would be wise to leave him alone for the present, and to pass an œsophageal bougie later if he lost ground. At the Birmingham Meeting last year a much younger child, who had a similar condition, had been shown ; gastrostomy was done, and after this he was able to swallow much better than before. It was hoped he would continue to improve, but in the winter he developed bronchopneumonia, of which he died. Until his death he was swallowing normally by mouth.

A. BELL TAWSE said that no radical operative treatment had yet been devised to deal successfully with congenital shortening of the œsophagus, hence all that could be done was towards amelioration. The diaphragmatic hernia was directly due to the failure of the œsophagus to elongate sufficiently. It was most important to avoid distension of the stomach. A careful diet and restricted meals would help. Frequent over-distension might lead to adhesions, and twisting of the stomach on its long axis might follow with increased obstruction to the passage of food. Even ulceration might occur. A few months ago, at a meeting of the Section of Laryngology,[1] he had shown skiagrams of a girl of 18, who had begun to vomit at the age of 6. Every year, or year and a half, she required dilatation of the stricture. The intervals were inconstant and the cause not apparent. The narrowing was not due to spasm alone ; there was a definite stricture of limited dilatability. The dilatation in these cases should be carried out with the utmost gentleness, under direct vision.

A. J. WRIGHT (in reply) said that another little boy had been brought to him suffering from a similar condition, which was ultimately fatal. Another patient, aged 65, seemed to enjoy having her stomach in her thorax, and he had wondered whether one should send such patients, when children, to some place where doctors did not exist, so that they could take their chance of growing up.

Specimen and Skiagrams of a Case of Congenital Shortness of the Œsophagus, with Stricture.—A. J. WRIGHT.

The stricture was treated by intermittent and continuous dilatation and gastrostomy, with eventual fatal termination as a result of instrumental perforation of the œsophageal wall.

[1] For notes of case see *Proceedings*, 1935, xxviii, 443 (Sect. Laryng., 15).

Thyroglossal Cyst of the Tongue.—A. J. WRIGHT.

A. W., female, aged 58.

First seen five years ago, with a feeling of fullness at the back of the tongue and swelling in the right side of the neck. The neck showed an abscess, from suppurating glands, which was drained and has given no further trouble. At the base of the tongue there was a smooth rounded elastic swelling.

A considerable portion of the cyst-wall has been removed on two occasions, once with scissors, and again, four years ago, with diathermy. The cyst has slowly filled again but does not produce any symptoms beyond discomfort.

Discussion.—F. C. ORMEROD said that these thyroglossal tumours on the back of the tongue were not very uncommon. Sometimes they were mistaken for lingual thyroids, and in some patients the tumour was the only thyroid tissue in the body. It had been removed in cases in which there was no thyroid, and in some of those cases myxœdema had resulted. Recently, in Westminster Hospital, there had been a boy, aged 16, with a tumour similar to the one shown. It had undergone sarcomatous degeneration, and had been treated by a radium bomb, which had arrested the sarcomatous change. In the present case, as the patient was aged 58, it was unlikely that a malignant change would take place, and it was scarcely worth while to operate. If symptoms persisted the tumour could be marsupialized by punching out portions of the wall to give drainage, and this might result in its disappearance.

E. COWPER TAMPLIN said that the swelling in the neck had nothing to do with the thyroglossal cyst, and he would advise operation. If the tumour were removed there would be no fear of sarcomatous degeneration. A midline incision, going through the hyoid bone and excising the central portion would probably show a thread-like duct, and that would give a line up to the cyst, and render dissection comparatively easy. That was probably the best course, as the woman had some breathing difficulty at night. If that course was not followed he suggested puncture and aspiration of the fluid.

C. A. SCOTT RIDOUT said he did not agree with Mr. Ormerod that the age of this patient was against the possibility of the growth becoming malignant. The operation required was a comparatively easy one, and there would probably be found the cord-like remains of a duct leading up to it.

MUSGRAVE WOODMAN said that the operation of access at the base of the tongue was more easy than would be generally supposed. He had performed it recently in three cases of malignant disease of the tongue. He kept to the middle line, split the muscles on either side, and took out $\frac{1}{4}$ in. to $\frac{1}{2}$ in. of the hyoid bone in the middle line. Holding the edges aside, the capsule is reached, and the tumour palpated. He agreed that if this were done there would be no difficulty in removing the cyst.

Recurrent Granuloma of Larynx following Mustard-gas Poisoning.—E. WATSON-WILLIAMS.

Mr. A. W. B. was under my care in January 1923 (then aged 29), suffering from hoarseness, due to a granuloma of the larynx: slight hoarseness had persisted since he was gassed with mustard-gas in August 1917. The granuloma was found to be attached to the larynx in the region of the anterior commissure, mainly subglottic, but to a small extent on the margin of the left cord near the commissure, and was removed by direct laryngoscopy, with complete relief.[1] On May 20, 1935, he returned complaining of slight hoarseness four months, worse three weeks, ascribed to a cold: no symptoms in interval. The anterior three-fourths of the left cord is hidden by a greyish, smooth ovoid mass, apparently sessile, and resembling in appearance a nasal polypus: movements of cord appear good: it is proposed to remove this mass as soon as he can make necessary arrangements.

H. BELL TAWSE said that he would suggest removal of the mass by the same method as that of the operation in 1923. The growth might become malignant, and doubtless the

[1] For full report see *Proceedings*, 1930, xxiii, 1533 (Sect. Laryng., 83); *Bristol Med. Chir. Journ.*, 1923, 154.

specimen would be examined microscopically. If the growth recurred he would advise laryngofissure with removal of the vocal cord, ventricular band, and the anterior commissure. In a case of his own, shown at a meeting of the Section in 1929[1], due to chlorine-gas poisoning, this procedure was carried out. He was glad he did not attempt removal by the direct method. The man returned to work soon afterwards without requiring to wear a tracheotomy tube, and had remained well ever since.

Specimen: Polypus of Œsophagus which caused Fatal Tracheal Obstruction.—E. WATSON-WILLIAMS.

Mrs. G. J., aged 58, was referred to me on April 17, 1935.

History.—One month previously she had had a slight cough and was wheezy, and the next day experienced some difficulty in swallowing meat—both quite novel symptoms. On the fourth day "an abscess broke in the throat and I coughed up a lot of blood and nasty matter." Since then she could only take fluids, often with great difficulty; slight wasting, voice unaltered.

On April 17 she coughed up yellow pus, and also retched up brown phlegm: a loud wheezing sound was noticeable, with bubbling, mainly expiratory, best heard in mid-line immediately above manubrium sterni, also in front of first right interspace. Respiratory distress obvious and increasing, sucking in of root of neck on inspiration, worse on extending head; lungs: bronchitis, no consolidation. Larynx: abductor paralysis of left vocal cord. P. 110; R. 28 (to 44); T. normal. No pain.

Skiagram.—A fusiform shadow 4" high, 2" broad, 1½" front to back, centre behind top of sternum: aorta looks as if pushed over to left by it, and trachea to right, œsophagus behind.

Diagnosis.—Peri-œsophageal abscess, bursting into œsophagus. Patient's condition did not allow further investigation.

Direct bronchoscopy (same day).—Larynx as stated: at 20 cm. from teeth the lumen of trachea is reduced to demilune slit by mass bulging in posteriorly and from left, much mucopus aspirated from below this, mucosa reddened, otherwise normal. Œsophagus, entrance normal; at 20 cm. from teeth left anterior wall bulges back, mucosa normal; lumen full of brown felt-like material. At 22 cm. soft irregular ulceration of anterior half of wall: tube passed gently on, end of mass at 28 cm. but bleeding so free that view impossible. Report: "Looks like invasion of œsophagus from mediastinum; if a growth, it is very soft and friable." One hour later S.O.S. from ward—urgent tracheotomy, and insertion of long rubber tube; relief.

On April 21 respiratory distress increased, temperature normal; collapsed and died.

Autopsy.—Myocardial degeneration secondary to bronchopneumonia. Œsophagus much dilated in upper six inches, and mucosa ulcerated. Attached to the cricoid region and hanging down the œsophagus was a large tumour, 5 in. by 2 in., on a flat ribbon-like stalk (of normal mucosa), the lower part of the mass was necrotic. Report: simple fibromatous polypus.

Eight Cases shown by Miss Sylvia B. Wigoder (introduced by Mr. E. Watson-Williams) to Illustrate Radium Treatment of Malignant Disease of Antrum and Ethmoid.[2]

I.—Mixed-cell Sarcoma of Ethmoid.

Mrs. A. F., aged 71. On June 1, 1931, complained of a polypus in the nose during four months, with "catarrh" (i.e. obstruction) and muco-purulent discharge—blood-stained on one occasion. There had been an injury to the nose in September 1930. Slight left proptosis; pain and tenderness round inner half of left orbital margin.

1 *Proceedings*, 1930, xxiii, 784 (Sect. Laryng., 26), 1417 (Sect. Laryng., 59).

2 Cases I to VII are tabulated in the *Practitioner*, 1934, cxxxiii, 719.

The inferior turbinal was replaced (or hidden) by a red, fleshy mass, bathed in sero-purulent discharge. Biopsy report: "Mixed-cell sarcoma." Skiagram: Left ethmoid opaque, antrum and frontal sinus probably full of mucus.

Operation (E. Watson-Williams).—June 12, 1931: Ten needles, each containing 2 mgm. of radium, 3 cm. long, 0·5 mm. pt. screen inserted: (*a*) three into ethmoid by orbital route, one above the other; (*b*) three into middle and inferior turbinals; (*c*) four across septum of nose on wire frame support; total dose, 3·3 gram-hours. March 1932: Upper part of nose showed extensive atrophy of mucosa; middle turbinal a mere plate, lower part filled by firm grey mass; altered inferior turbinal; no glands. October 1934: Apparently typical atrophic rhinitis, with only indications of turbinals; hard green crusts, and fetor. (Right side, milder atrophy, no crusting.) Left eye had been growing dim during past six months; right purblind for six years; progressive corneal opacities right and left. General health very good.

II.—Transitional Carcinoma of Ethmoid.

H.P., aged 57, seen on February 5, 1934, complained of nasal obstruction for four months; no other symptoms. Nasal polypus had been removed in November 1933. *On examination*: Right middle meatus blocked by a polypus: on removal this proved to be very soft and friable ("? neoplasm"), had eroded the inferior turbinal and replaced the middle. The ethmoid was cleared out; very little bone remained, only a mush of soft pulpy tissue. Both antra contained pus, and the mucosa was thickened and polypoid. Biopsy report: "Polypoidal growth lined with transitional epithelium which dips down and forms masses which extend into centre, basement membrane broken through. Simple polypus with precancerous changes."

Operation, 16.2.34 (E. Watson-Williams).—6 by 6·25 milligrams of radium in 0·6 platinum screen packed into ethmoid and kept in position with gauze; total dose 2·7 gram-hours.

February 1935. General condition very good: nose shows extensive atrophy, with crusting; uses douche.

III.—Squamous Carcinoma of Ethmoid and Antrum.

Mrs. M. A., aged 57. On September 15, 1932, complained of painless left nasal obstruction during four months with watery (never bloody) discharge. No external swelling, no glands: edentulous: left epiphora. Olfaction normal; no offensive smell. On examination a mass of soft, pink granulations (bleeding readily on touching) is seen protruding between left middle and inferior turbinals; and by posterior rhinoscopy, filling the choana. X-ray: Left side of nose, left antrum and ethmoid quite opaque: expansion of antrum inward and also down into palatal region: frontal sinus full of mucus.

Operation (E. W.-W.).—September 23, 1932: Per-oral antrostomy. Antrum full of thick, glairy mucopus: lining membrane slightly thickened. Three needles of 2 mgm. radium, 3·2 cm. long, 0·5 mm. pt. screen, inserted into mucosa of nose along inner wall of antrum: two needles of 1·33 mgm. radium, 2 cm. long, 0·6 mm. platinum screen, into ethmoid by orbital approach, total dose 2·1 gram-hours. Biopsy report: Antral mucosa = carcinoma arising out of antral mucosa of modified squamous type, slow growth and moderate malignancy: tissue from nose, frankly carcinomatous, considerable malignancy.

October 19, 1932. Oral opening into antrum; 10 seeds containing 2 millicuries radon each, 0·5 mm. platinum screen, packed into antrum all round walls, using cyanide gauze: gauze end brought into nose, and mouth incision closed.

March 1935. There is a wide oro-antral opening, closed by a dental obturator. Antral and nasal mucosa dry, with small scabs; antro-nasal wall has disappeared. No sign of any recurrence of growth, general condition very good.

IV.—Lymphosarcoma of Ethmoid and Antrum.

Mrs. S. W., aged 74. On May 25, 1933, complained of tightness in right nostril for eight months, with purulent (occasionally blood-stained) discharge. No previous nasal disease. Right temporo-malar headache during three days. Olfaction good, marked fetor. Right cheek swollen, and slightly tender: palate normal, edentulous. Two irregular hard fixed glands beneath sternomastoid muscle at level of angle of jaw. The nose shows a sloughy polypus appearing between the middle and inferior turbinals.

Skiagram.—Opacity of right antrum and ethmoid, with destruction of bony walls of antrum.

Operation, June 14 (E. W.-W.).—Block-dissection of glands of neck, with insertion of four needles of 2 mgm. radium, 0·5 mm. platinum screen. Per-oral antrostomy: antrum full of mucopus, and lined with thick velvety malignant tissue; four needles of 1·33 mgm. radium inserted, and packed in with gauze, threads brought out through nose.

Three needles of 1 mgm. radium inserted along septum, two into right ethmoid (orbital approach), two into middle meatus of nose, one in inferior meatus; total dose 8 mgm. 0·5 mm. platinum screen. Total dosage of radium, antrum 1·06 gram-hours, nose 0·62 gram-hours, neck 2·3 gram-hours=4 gram-hours. Biopsy report: (glands and mucosa) "lymphosarcoma."

Two subsequent courses of deep X-ray therapy to neck.

March 26, 1935. Extensive atrophy of right side of nose; no sign of any recurrence: general condition very good.

V.—Schneiderian Carcinoma of Ethmoid and Antrum.

Mr. J. W., aged 44, complained of blocking-up of left side of nose after "flu" one year ago, and of an "uncontrollable greenish-yellow discharge."

Condition on examination.—Left side of nose: pink, irregular mass, not tender and not bleeding on being touched.

X-ray report.—Whole of left ethmoid and inner half of left antrum are opaque. Wassermann reaction negative.

Pathological report.—13.6.34: "Growth composed of loose connective tissue showing much round-cell infiltration in places. Blood-vessels fairly numerous. Covered by transition epithelium which in places is growing downwards, and is showing infiltrating growing edge—cells mostly of embryonic type show some inequality of shape and size and evidence of rapid growth—Schneiderian carcinoma."

15.6.34. *Operation.* (Scanes-Spicer. E. W.-W.).—Whole ethmoid appeared to be pulp; no bone left; antral walls unaltered, but thick soft growth all over. Radium inserted: Antrum, 4 by 1 mgm.; nose, 4 by 1·33 mgm.; septum, 1 by 1·33 mgm.; through margin of orbit, 1 by 2 mgm.; 2 by 1·33 mgm.

25.6.34. Radium removed after ten days as eye became inflamed.

13.7.34. General anæsthetic. Radium inserted: olfactory cleft, 2 by 5 mgm.; floor of nose, 2 by 5 mgm.; total dosage, 4·7 gram-hours.

15.7.34. Radium removed after thirty-six hours.

22.11.34. Some pain in left temple. "Pins and needles" in left cheek, which is a little puffy. Some crusting in nose; never bleeds. Turbinal atrophy beginning, but no sign of recurrence.

11.4.35. Satisfactory. Atrophy well marked. Patient has been at work since August 1934 (not lost a day). Has gained 7 lb. Condition good. No recurrence; epiphora.

VI.—Schneiderian Carcinoma of Antrum.

Mrs. H. L., aged 66. On April 18, 1932, complained of feeling of numbness in right cheek for six weeks, following influenza, with pain in right eye. Right cheek slightly

swollen and very tender, but not red; slight ptosis and proptosis, vision unimpaired. Palate normal; edentulous. No nasal symptoms, no discharge, nothing abnormal seen; no glands. Right temporal headache. Wassermann reaction negative. Skiagram: left antrum opaque, apparent bone destruction in right malar region.

Operation, May 5 (E. W.-W.).—General anæsthesia. Per-oral antrostomy: anterior bony wall of antrum eroded near centre, just above gingival portion; lining membrane rather irregular and papilliform, some mucopus in antrum, bleeding slight; appearance rather suggestive of malignancy, but tissue firm. Biopsy: "Much of this growth is composed of fibrous tissue densely infiltrated with small round cells. The transitional epithelium has grown inward forming masses and cords throughout the fibrous tissue. These epithelial cells are definitely carcinomatous and growing rapidly—carcinoma of Schneiderian type."

May 13 (E. W.-W.). 10 needles of 1 mgm. radium, 2·7 cm. long, 0·5 mm. platinum screen packed into antrum in a fan-shaped manner. Three needles of 2 mgm. radium, 4·5 cm. long, 0·5 mm., platinum screen, placed (1) in ethmoid, by orbital approach, (2) through middle turbinal, (3) through mucosa of inferior turbinal. Total dose: 4 gram-hours.

February 1934. Perfectly well, no sign of recurrence; mouth normal; moderate nasal atrophy.

May 1935. Perfectly well.

VII.—Small Round-cell Sarcoma of Antrum.

Mrs. E. H., aged 61. On October 24, 1932, complained of stiffness and swelling in left cheek during two months; not increasing. A tooth had been extracted a month after the onset, and a skiagram taken then was reported "negative"; the few remaining teeth were normal. No nasal discharge; left nasal passage wide, rather dry. Cheek definitely swollen but not tender; palate normal. Small firm gland felt beneath anterior margin of sternomastoid at level of angle of jaw. Skiagram: œdema of cheek and *probably* neoplasm of antrum.

November 2 (E. W.-W.). General anæsthesia. Nose absolutely normal. Per-oral antrostomy. In two places, anterior bony wall of the antrum destroyed, appearances suggesting that destruction was due simply to a dental granuloma: cavity of antrum half filled by greyish, soft malignant growth. Three needles of 1·33 mgm. radium inserted across roof; four of 1·0 mgm. two along outer and two along inner walls; 2 mgm. also in adjacent part of nose under inferior turbinal. All screened, 0·5 mm. platinum screen; total dosage 2·9 gram-hours.

Pathological Report.[1]—"This is polypoidal mucosal hypertrophy. The surface is covered by normal columnar ciliated epithelium and the tissue beneath is œdematous and rather cellular while deeper down the condition is sarcomatous and there is some erosion of bone. The sarcoma cells are chiefly of small rounded type. Vessels are not numerous and have fairly thick walls. Polyp become sarcomatous."

Subsequent pack to side of neck, 10 mgm. radium in six needles, 0·5 mm. platinum screen, 1·0 cm. from skin: total dosage 4·0 gram-hours. Mouth wound broke down, leaving a wide oro-antral opening.

February 1934. Condition very good; no sign of growth or glands; mucosa very atrophic both in antrum and nose; patient has to use a douche to get rid of crusts. Dental obturator worn.

May 1935. Very well.

VIII.—Transitional Carcinoma of Antrum.

Miss B. G. aged 70. Complained of swelling of gland in right side of neck for three months; firm, painless, mobile: feels like lymphosarcoma, no recent nasal symptoms: anosmia all her life, following measles. Nose—atrophic rhinitis, no crusts, no fetor.

1 Report given in the *Practitioner* is incorrect

Operation, 28.9.34 (E. W.-W.).—Nodular mass consisting of three matted glands removed. Very small hard fourth gland removed. More similar glands felt especially posteriorly.

Pathological report on glands.—Transitional-cell carcinoma.

Skiagram.—Opacity of right antrum.

Two doses of deep X-ray therapy to side of neck.

Operation, 17.10.34 (E. W.-W.).—Per-oral antrostomy. Mucosa showed slight general thickening about quarter inch deep covered in mucopus. Bleeding very free. Perinasal antrostomy. Radium inserted: Nose, 4 by 2 mgm.; antrum 6 by 1 mgm. Total dose 4 gram-hours.

29.10.34. Radium removed.

14.2.35. Nose—dry crusting. Small oro-antral fistula. Complained of aching pain at the back of the nose; severe at times. Gland felt at lower cervical group on right side. General condition very good.

Discussion.—LIONEL COLLEDGE said this was a very satisfactory group of cases, for several reasons; the value of a series was much greater than that of a few isolated cases. It seemed that the satisfactory results represented 80% of the whole series. Another valuable point was that all the cases had been treated by the same method.

The actual results of the cases were very good; they showed nothing worse than some atrophic rhinitis. The cases also, he considered, illustrated that the advice sometimes given that the palate should be removed so as to gain access—and also to enable the area to be kept under observation—was not good advice; these cases showed that that procedure was an unnecessary mutilation.

Another lesson they gave was that the radium was better used in doses of from 15 to 20 mgm. over ten or twelve days than in massive doses applied for short periods. Very few cases were now treated by simple surgical excision, though for some this was still a good method. The choice now lay between radium and electro-surgery. He did not think it was good to employ both. In Stockholm these cases were first dealt with by electro-surgery and then radium was applied. He thought that in the ethmoid, radium was the better treatment, but the treatment adopted depended on the exact situation of the tumour.

What was the significance of the term "Schneiderian" as applied to these cases?

Miss WIGODER, in reply to various questions, said she did not think that any special eye changes had supervened; one or two patients had complained that their sight was worse, but when they had been referred to the Ophthalmic Department nothing abnormal had been found. Another question concerned bone necrosis; this had not been found up to the present.

It was necessary to get close to the base of the growth so that as wide a surrounding area as possible should be irradiated, and for this reason it was found better to insert radium needles into the base of the growth rather than to use a stent mould in the cavity.

E. WATSON-WILLIAMS (in reply) said that the term "Schneiderian" carcinoma was that used by Dr. Fraser, the pathologist; he understood it to mean a growth composed of cells of the same type as those in the Schneiderian membrane.

Chronic Sinusitis with Obscure Periodontal Focal Sepsis of Many Years' Duration—PATRICK WATSON-WILLIAMS.

A woman, aged 50, who had been under observation and treatment over four years, was referred to me by Dr. Furness of Montreal in 1933, on account of periodic acute supra-orbital headache and nasal discharge.

In 1928 former peri-apical sepsis of the left upper incisors, with a definite radicular cyst of the central incisor had apparently cleared up after tooth extractions, but, as the left antrum had become involved, Dr. Furness had performed a Caldwell-Luc operation, and, later, exenteration of the ethmoid cells and per-nasal drainage of the frontal sinus.

In 1933 the pain in the left orbito-nasal angle, with periodic swelling of the eyelids, induced me to make freer entry to the frontal sinus and remove remaining ethmoid cells as completely as possible. The patient went home.

In June 1934, as the periodic headaches persisted, Dr. Furness again sent her to me, so again I reviewed the early history of alveolar bone sepsis. Yet special skiagrams failed to reveal any abnormal condition. The bone laid bare by reflecting the muco-periosteum appeared normal, but when the underlying bone was burred by Dr. Claremont he found a softened area—the débris from which yielded profuse growth of *Streptococcus viridans*. Suspicions aroused by her history had at length led to the discovery of this still actively virulent septic focus hidden in the bone, with no local evidence of its persistence throughout the intervening six years since the last tooth was extracted.

Believing that it was from this septic cavity that organisms originally penetrated the bone walls of the sinuses as well as the mucous membranes, I resorted to an operative method suited for such conditions, which I first used many years ago. Through an incision per-nasally, along the margin of the nasal notch, the periosteum was reflected from the anterior face of the antrum and from the inner surface of the antro-meatal wall. The bone was removed from the inner half of the anterior wall and the nasal notch, down to the floor—corresponding with an area of recurring tenderness.

The patient has improved mmensely and become much stronger, but is still not free from recurring supra-orbital headaches and swelling of the eyelids. It is suggested that these attacks are due to periodic sensitization of organisms still present in the bone and submucosa of the sinuses. Following a recent attack of influenza, the right antrum became infected. Antrostomy will shortly be performed.

Postscript.—After drainage of the right antrum, all abnormal symptoms disappeared.

Aneurysm of the Internal Carotid Artery.—J. ANGELL JAMES.

L. R. A., a boy, aged 12 years,

History.—First seen February 25, 1935, referred by Dr. H. Johnstone of Wellington, complaining of thickness in the throat, with indistinct speech, dating from a quinsy in July 1934, when he had a very severe hæmorrhage from the right side of the throat. Four years ago his jaw was fractured when he was knocked down by a motor bus and his general health has not been good since.

On examination.—Right tonsil displaced inwards by a smooth swelling the size of a plum, in the lateral pharyngeal wall, with expansile pulsation. Paralysis of the right side of the palate, with resulting rhinolalia aperta. Right pupil contracted, and right palpebral fissure narrowed. On compression of the common carotid the swelling did not collapse, but tension was diminished, and pulsation was reduced.

Operation, 26.2.35.—The common external and internal carotids were exposed on the right side. Compression of the common carotid abolished pulsation entirely. Compression of the internal carotid reduced, but did not abolish, pulsation completely. Compression of the external carotid had no effect. Ligature of the common and external carotids was performed.

30.4.35. Swelling reduced to quarter its original size. Voice greatly improved, but palate and eye condition unchanged. The boy's parents state that his general health is much better than it has been since his jaw was fractured.

Post-cricoid Carcinoma Treated by Interstitial Radiation.—J. ANGELL JAMES.

H. S. R., male, aged 49.

History.—First seen on August 4, 1933, complaining of nasal obstruction and discharge for thirty years; for difficulty in swallowing nine months.

On examination.—Deflected septum to the left, nasal polypi present on the right side. Excess of mucus in the pyriform fossa on both sides. No enlargement of glands.

16.8.33. Œsophagoscopy. Fungating mass in post-cricoid region. Biopsy: Squamous-cell carcinoma.

Operation, 23.8.33.—Incision along the anterior border of the right sterno-mastoid. Carotid and internal jugular displaced forwards. Ten 1 mgm. needles of radium inserted between the posterior pharyngeal wall and vertebral column, immediately behind the cricoid. Wound sutured.

Nine days later wound reopened, radium removed.

23.11.33. Œsophagoscopy showed no evidence of neoplasm at the original site, but a small nodule on the posterior pharyngeal wall at the level of the arytenoid. Three 2-millicurie seeds of radon inserted.

18.2.34. Large mass of hard glands appeared on the right side, extending up to the parotid. The pharynx and œsophagus were clear. Block dissection of glands on the right side. The spinal accessory nerve and the cervical branch of the facial nerve were found to be involved in the mass and were divided.

19.2.35. No sign of any recurrence in throat or neck. Hyperæsthesia of lobe of right ear; paresis of right lower lip.

Leontiasis Ossium.—J. ANGELL JAMES.

E. D., female, aged 38.

History.—First seen March 14, 1930, complaining of swelling over the right eye for seven years, with severe frontal headaches. No diplopia.

On examination.—Hard fixed swelling in roof of right orbit and adjacent anterior surface of frontal bone. X-rays showed very dense shadow in the orbit and anterior plate of frontal bone.

Operation, 28.5.30.—Great thickening of the bone over the orbital plate and anterior plate of the frontal bone; a large amount of this dense bone was removed. The supra-orbital nerve and vessels were found buried in it. The remains of the frontal sinus cavity, with the occluded fronto-nasal duct were opened. There was no evidence of infection. The wound was then closed. Headaches were completely relieved.

10.6.30. Complained of diplopia. Wound healed well.

4.3.35. Has been very well until three months ago, since when the headaches have recurred. X-rays showed the frontal sinus cavity still visible, and increased density of bone shadow involving the whole roof of the orbit and the anterior plate of the frontal bone. Diplopia persists. The right eyeball is displaced outwards.

Osteomyelitis of the Frontal Bone.—J. ANGELL JAMES.

P. J., a boy, aged 4 years, first seen at Bristol Children's Hospital on October 15, 1934. Temperature 101. Left acute ethmoiditis, with marked swelling of the left upper lid, and marked proptosis of the left eye. Palliative treatment for twenty-four hours. Condition deteriorated.

Operation, 16.10.34.—Left ethmoidotomy. Orbital abscess drained. Ethmoidal labyrinth also opened into the nose. Bacteriological report on discharge: *Staphylococcus aureus.*

18.10.34. Swelling and tenderness of both upper lids and forehead. Mr. R. R. Garden reported: "Right ocular movements full and free. No proptosis. Left ocular movements present, but restricted."

20.10.34. Œdema now involving both cheeks.

23.10.34. Fluctuating swelling from right pinna to glabella. Left side improving. An incision through the right eyebrow, exposing the bone over the frontal and ethmoidal region, showed no abnormality, but a subperiosteal abscess was found over the external angular process of the frontal bone. This was drained and continued to discharge until November 1, 1934, when the drainage tube was removed.

14.11.34. Temperature had risen to 98·8 on several occasions. General condition very much improved. The child had been getting up and the swelling had subsided, except in the right temporal fossa. A small fluctuating swelling appeared over the glabella to-day.

Skiagram showed extensive osteomyelitis of the frontal bone, extending 6½ inches back from the glabella, to the left external angular process of the frontal bone, and to the level of the external auditory meatus on the right side.

Operation.—Under general anæsthesia a T-shaped incision was made; the skin and pericranium were stripped down; granulations were found to be sprouting through the outer table. The whole area of both tables was removed, with one-inch margin of healthy bone all round. There were numerous isolated extradural abscesses; the dura was covered with granulations. The flaps were replaced, and held roughly in position with a few sutures, and the cavity packed with gauze soaked in acriflavine. Two blood transfusions were given during the course of the operation. Adhesion of the flaps to the dura was prevented until suppuration had ceased.

After a stormy convalescence the wounds finally healed, and on May 4, 1935 the general condition was excellent. Skiagrams show evidence of new bone formation in the centre of the flaps on both sides.

Three Cases of Frontal Sinusitis treated by Harmer's Intubation Method.—E. MILES ATKINSON.

I.—J. W., male, aged 29.

Admitted to hospital with great swelling of left side of forehead and eye; severe pain, but temperature not raised.

Operation, 30.1.35.—No pus was found in the sinus, but on opening it there was an escape of foul-smelling gas, and the mucosa of the sinus was intensely congested. No. 3 catheter inserted down infundibulum.

After a few days there was a profuse discharge which continued for some weeks. Swelling gradually subsided.

28.5.35. No. 7 catheter still in position. Discharge practically ceased. No pain or swelling for several weeks.

II.—T. S., male, aged 54.

In October 1934, "influenza"; since then frequent left frontal headache. During the two months before patient's admission to hospital the headache had been more severe, with occasional swelling of the left eyelid and discharge from the left nostril. Skiagrams all negative.

Operation, 5.3.35.—Lining mucosa markedly inflamed; sinus contained glairy mucopus. No. 3 catheter inserted.

After operation the swelling and pain disappeared and have not returned.

13.5.35. Wore tube for seven weeks, working up to No. 7. No further trouble.

III.—E. F. S. O., male, aged 38.

History of influenza in 1917 with much frontal headache. Several attacks since, lasting from one to five weeks; last two attacks severe and incapacitating; some discharge from right nostril in last attack. Supra-orbital neuralgia diagnosed despite skiagram which showed a doubtful sinus.

First seen 1931 during an attack, when there was evidence of right frontal sinusitis; some œdema of middle turbinate, slightly tender to pressure; trans-illumination questionable; right frontal sinus opaque in skiagram.

Operation, 14.4.31.—Sinus contained thick, inspissated pus. No. 3 catheter inserted. Catheter gradually increased to No. 7; tube worn for three months.

Apart from some headache in November 1933, during the course of a cold with bronchitis, the patient has had no trouble since the operation and has much improved in health.

Tuberculous Maxillary Sinusitis and Laryngitis.—W. A. MILL.

The patient, a man aged 23, first attended hospital in March 1933 complaining of hoarseness of six weeks' duration. The laryngeal appearance, with redness and infiltration of both cords but especially the left, suggested tuberculosis, but all efforts to find the bacilli in the sputum, or evidence of chest disease failed. There was a mild infection of both antra which were washed out several times. As the mild nasal discharge persisted the antra were drained intranasally.

The voice and laryngeal condition improved until January 1934 when the patient reappeared with marked swelling in the arytenoid regions. As there was still some nasal discharge the antra were drained by a double Caldwell-Luc operation. The mucosa on both sides was polypoid, but one piece was noticed to contain a number of minute grey points. These on section proved to be tubercles. Further investigation failed to show any disease in the chest.

The patient was transferred to the Brompton Hospital where a piece of tissue taken from the larynx was proved to be tuberculous.

[*June* 15, 1935]

Chairman—W. M. MOLLISON, M.Ch. (President of the Section of Laryngology)

The Sinuses in Relation to Eye Disease

By E. R. CHAMBERS

IF tuberculosis, syphilis and trauma are excluded, a great majority of all ocular infections are due to some endogenous focus, and for many years it has been our practice to subject patients with these conditions to a thorough investigation, in the hope of finding such a focus. There is no doubt that the nasal sinuses can be held responsible in a large number of cases, and we have been struck by the fact that these cases need not show any obvious nasal trouble, and that X-ray findings, if negative, cannot be relied upon.

It must be remembered in dealing with these ocular infections, particularly those involving the cornea, that no time must be lost if serious impairment of sight, or perhaps blindness, is to be prevented. I can recall many instances in which, had the sinuses been investigated earlier, there is no doubt that serious impairment of vision might have been prevented.

To demonstrate the association between nasal and ocular infection, it is only necessary to enumerate a few ocular conditions which have not responded to local treatment to the eye, but have cleared up entirely when the nasal infection has been treated.

Conjunctiva.—There is a mild but chronic type of conjunctivitis affecting chiefly the lower lid; there is very little discharge, but the patient suffers from itching and burning, which is aggravated by bright light, dust and wind.

It is characteristic of this infection that it will clear up almost completely with simple ocular antiseptic treatment, but recurs directly the treatment is stopped. Many of these cases go on to a thickened, velvety condition of the conjunctiva of the lower lid, partly as a result of the recurrent attacks but largely owing to over-treatment.

This type of conjunctivitis is in many instances due to nasal infection which is often overlooked, and I have known many cases of complete recovery in which, the nose having been dealt with, no further ocular treatment has been necessary.

Sclera.—Episcleritis is an infection of the superficial layers of the sclera and is characterized by chronicity and recurrences. For many years this condition has been ascribed to rheumatism, because it is usually associated with joint pains or neuritis. Whether it is a coincidence or not we have found that many of these cases harbour an infected antrum, and that the elimination of this focus has resulted in a complete cure.

Cornea.—Any type of keratitis can apparently be caused by endogenous sepsis, but there is one type that seems to be caused by sinus infection more than others. It is not unlike the interstitial keratitis of syphilis, but the opacity in the cornea is more patchy and it occurs in adults.

First one eye is attacked and it remains localized in this eye often until the cornea contains very little transparent tissue; then the other eye is involved.

In such cases the sinuses should be carefully investigated. In a case seen recently the sinuses were undoubtedly the cause, but had not been investigated, with the result that when we saw the patient the sight in one eye was lost and the condition was beginning in the other. Treatment of the sinus infection stopped further progress.

Iridocyclitis.—This is an involvement of the iris, ciliary body—and, often, choroid—by an infection from a focus outside the eye. Looking back over the years since we have carried out general investigation in these cases, I have no hesitation in saying that nasal sinus infection has played a large part in this condition, and it is here particularly that these sinuses should be investigated early. Reliance should not be placed solely on local ocular treatment.

Choroid and retina.—We see such conditions as choroiditis, retinal hæmorrhages and exudates, some of which are undoubtedly toxic, so that full investigation should be made in order to discover a possible cause, but these conditions tend to clear up so often when nothing is done that it is difficult to say that a focus of infection here or there was the actual cause.

There is, however, one condition in which I think sinus infection may play an important part. I refer to those cases of sudden loss of central vision in young and apparently quite healthy subjects. The ophthalmoscope shows a small hæmorrhage in the retina at the centre of vision. Such cases are not uncommon, and I regard them as due to an endogenous infection, the toxins from which have caused damage to the capillary wall, with a resulting hæmorrhage, the source of the infection being often found in the nasal sinuses or teeth.

The optic nerve.—Retrobulbar neuritis does not come within the scope of this discussion, as the affection of the nerve is behind the eyeball but there is a condition which affects the nerve-head and presents a definite ophthalmoscopic appearance. This is a papillœdema of the optic nerve where the swelling may reach 4-6 diopters.

It usually occurs in subjects between the ages of 20 and 40 and is more common in females than in males. The swelling of the optic discs is often so great that suspicion arises of some intracranial condition which has caused a rise of the intracranial pressure; but the fact that it is unilateral and neurological findings negative exclude this.

Owing to the œdema that may exist in the optic nerve-head, permanent damage may be done and the patient left with a contraction of the visual field. I have advised that the sphenoidal sinus should be investigated in these cases, that it should be done early and even when examination gives negative results the sinus should be washed out.

It is true that the swelling of the optic disc tends to subside without treatment, but this takes many weeks, during which there is permanent damage to the optic nerve as is shown by the contracted visual fields. Early attention to the sphenoidal sinus may materially shorten the disease and so reduce the chance of permanent damage.

Nasal Sinusitis and Infections of the Eyeball.—E. WATSON-WILLIAMS.

[*Abstract*]

Nasal sinusitis is easily overlooked unless the search for it is included as a routine. In the first place, the sinuses are out of the ordinary lines of inspection. In the second, there may be no history pointing to nasal disease, or any nasal symptoms, and there may be no clinical evidence of sinus infection when an inspection is made. A vigorous local defensive reaction seems to protect against toxic absorption. On the other hand, if there is sinus infection with no or very little local defensive reaction, there may be little to attract attention to the nose, yet it is in these circumstances that the patient suffers from toxic absorption with arthritis, fibrositis, depression, and often the patient with eyeball disease comes into this category. Further, not only is there often no clinical evidence of disease in the nose, but even X-rays cannot be trusted to exclude this type of infection. In these circumstances the only method that offers a satisfactory means of excluding sinus infection is to pass a cannula into the sinus, to wash out the cavity with sterile water which can be sucked back through the cannula, and to examine the washings microscopically and bacteriologically. In all the cases under my care the technique of Dr. P. Watson-Williams has been followed.

As Mr. Chambers has emphasized, it is important, if permanent damage to vision is to be avoided, that the sinus examination should be undertaken early.

In treatment, although disinfection of the sinuses may produce a rapid improvement, it is nearly always necessary to provide per-nasal drainage of the affected cells if recurrences are to be avoided. There is one exception to this rule, the case of young children, in whom it will often suffice to remove adenoids and to wash out the infected sinuses. Chronic sinusitis is common in children, and not very rare even before the third birthday. This type of infection, with perhaps no local signs, may persist for years unsuspected, occasioning repeated attacks of eye disease and often doing permanent damage before attention is directed to the original and persisting cause.

When the question is raised whether the sinus infection is really causative of, or only accidentally coincident with, the eye disease, the test to apply is whether when the primary focus is treated, the eye-disease, hitherto intractable, improves with great rapidity and does not recur. Some years ago I published a series of six cases which fulfilled this test[1]: of these, one is untraced, the later history of another is given below, and in the others the patients have remained well. The case reports given below have been chosen to illustrate the points mentioned. I must apologize for three of them being reports of recent cases, which I had not noticed until they had been printed in the summary of my paper, but I have every confidence that the results of treatment will be as good in them as in the others.

Illustrative Cases.

Wassermann reaction negative in all cases. Examination of teeth, vagina, urine and fæces, negative.

I.—*Recurrent keratitis.* Miss E. P., aged 52, complained in October 1931, of recent loss of vision.

On examination.—Old corneal opacities from former keratitis; patient edentulous. No nasal signs or symptoms, throat condition negative; history of nasal discharge at beginning of eye-disease many years before. X-ray report "Sinuses clear; skull thick." I thought, however, that the condition of the left antrum was suspicious, and therefore I washed out the sinuses. The washings were macroscopically clear, but examination showed that both sinuses contained mucopus which grew streptococci; the sphenoids were clear and sterile. The vision improved greatly after the washing, and the patient went home, with instructions to return at once if there was any further trouble. Severe recurrence of keratitis began in

1 *Lancet*, July 9, 1932, p. 73.

April 1932. I again washed out the maxillary sinuses (washings clear and sterile) and in view of previous history opened both sides. I also removed the tonsils as a precaution; culture showed *Streptococcus viridans* and *Staphylococcus albus*. The eye rapidly improved and the patient went home ten days afterwards.

Dr. Toye of Bideford writes (May 1935): "No nasal or throat symptoms; eye still damaged by old keratitis; just occasionally has threatened attack of inflammation. Greatly improved by the operation, very much pleased by result."

II.—*Recurrent scleritis.* Miss K. C., aged 35, referred to me by Mr. Chambers, February 2, 1935 with scleritis; she had had several attacks during the preceding three years. No history or symptoms pointing to nose or throat infection. Tonsils small and clean; pharynx normal except for slight lateral pharyngitis. Nose appeared absolutely normal; but X-rays showed opacity of left antrum. Right antrum felt "velvety"; washing contained a little liquid mucus, smear = "mucus"; culture: a staphylococcus; left antrum gave the polypus sign, and the washing contained excess of mucus (report as for right antrum); sphenoidal sinus (same cell, probably right, entered from both sides) and left posterior ethmoidal cell, clean washings, sterile. Antrum opened on both sides. Mucosa of right showed gross polypoid changes; that of left, polypoid; large polypus in cavity; reported "mucosa œdematous, much round-cell infiltration; simple myxomatous polypus." A week later the patient went home, her eye having become practically normal.

May 1935. Quite well; no symptoms.

III.—*Recurrent left iridocyclitis since childhood.* Miss A. B., aged 34, in January 1935 complained of pain and redness with dimness of vision, on and off since infancy; active iridocyclitis. Right eye blind; old iridectomy. Nose, rather dry, no symptoms, small polypus high on left side. Skiagram: Left antrum opaque, ethmoid dubious.

Right antrum washed out; clean washing; smear negative; culture sterile; left antrum contained thick pus, gave polypus sign (smear = mucopus, culture sterile). Left antrum, opened. Mucosa grossly polypoid. Left ethmoid opened. Twelve days later eye much improved. May 27, 1935: Quite free from all nasal and left eye symptoms. Vision good.

IV.—*Chronic conjunctivitis in child aged* 3. Conjunctivitis and blepharitis almost constantly since age of three months. History of suppurative otitis as nursling, but colds rare; never sore throat or nasal discharge. May 1935: Examination of nose and throat: negative. Examination of sinuses: right and left antra full of mucus. Both antra washed out only. Tonsils and adenoids removed.

Reports.—Antra: Trace of mucopus; culture, streptococcus. Adenoids: Streptococcus +++, *Staphylococcus albus* +. Tonsils: Streptococcus +, *Staphylococcus albus* +++.

Discussion.—ALEX. R. TWEEDIE asked whether Mr. Watson-Williams had any special technique for culturing the effluent in these cases, as he himself had been unsuccessful in attempting to culture specimens from the sinuses under these conditions. He had lately been testing the culturable content of the nasal mucus, and he had found that generally when such content was culturable the growth was more vigorous on media with a reaction at pH 7·4 and 8·8. Except for *Staphylococcus aureus* and *albus* no growth was ever obtained on a medium at pH 6·5. He considered that the *Staphylococcus aureus* was definitely pathogenic but usually regarded the *Staphylococcus albus* as due to contamination.

E. A. PETERS said that the possible methods of eye infection were by the air and blood; also along the lachrymal duct either by direct extension or by propulsion. In the case of a patient of his who inflated the lachrymal sac when blowing the nose there was no eye trouble. He believed that the mucus membrane of the lachrymal duct followed the condition of the mucous membrane of the nose.

J. F. O'MALLEY said the papers seemed to show a strong association between ophthalmic and sinus conditions, but there was some difficulty in accepting this from all aspects. For instance, as Mr. Peters had suggested, sinusitis following sepsis in the nose might be a continuous one—an ascending infection; but in regard to iridocyclitis or papillœdema, it was necessary to view it from the standpoint of an endogenous infection, as in that case there could be no continuity, except that there might be a possible œdematous extension from the posterior ethmoidal cells. It was a different matter if there was ulceration, or

osteitis in the wall of a sinus, or a granuloma, or an ulcerated focus on the tonsil. He had had cases in which such an association as that described seemed definite, but they were all tonsil cases, cases of iridocyclitis which were referred to him by the ophthalmic surgeon, the causes for which were classed, in the old days, as rheumatic. As Mr. Chambers had remarked, there were also other symptoms, suggestive of rheumatism, and the tonsils were held to be responsible. On removal of the tonsils the iridocyclitis cleared up, and remained absent. These cases tended to clear up spontaneously thus emulating the tendency of the underlying infection. With the occurrence of a fresh focus, there was a recurrence of the remote lesion.

T. RITCHIE RODGER said that Mr. O'Malley had made an important point, and one well within the scope of this discussion, namely, the relative importance of sinusitis and tonsillar disease. Mr. Chambers' paper did no more than state that the sinuses were responsible for a large number of eye affections. Ophthalmologists in his (the speaker's) hospital were continually sending over to him cases of this kind, and for a long time the question asked was whether he could find anything wrong in the sinuses. Three times out of four his report, after X-ray examination, transillumination, and washing out of the antrum, a regular procedure, was that the sinuses were normal, but that he could squeeze a little pus out of one or both tonsils. The formula of the request had now been changed, and the query now was, could he find any septic focus? Probably there was a natural inclination to think first of the sinuses because of the close contiguity of the parts, but there was no continuity in the case of iridocyclitis and those deeper affections of the eye to which Mr. Chambers referred. It was a blood-borne infection. He hoped the teeth and tonsils would be examined with equal care.

A. B. PAVEY-SMITH said that all the illustrative cases mentioned by Mr. Watson-Williams were recent; it would be valuable if he would report on those cases again in six months' time. Sometimes a temporary improvement occurred for a month or two after the operation, and then six months or so later there was a complete relapse, the improvement being due to some alteration in the systemic condition other than the elimination of the particular infection.

He wondered whether in the five cases quoted Mr. Watson-Williams had experienced what sometimes occurred in dealing with focal infection, namely, a flare-up of the systemic condition. He (the speaker) had met with this in cases of arthritis after removal of tonsils, and in such cases regarded it as evidence that he had "touched the spot."

PATRICK WATSON-WILLIAMS said that the papers which had just been read possessed a special and profound interest for him, because he had first started on the subject of sinus exploration towards the close of the last century, when Mr. Richardson Cross, then a leading ophthalmologist in Bristol, used to refer to him patients suspected of having sinus infection causing the eye conditions.

Hence when such cases were referred to him it was in order to avoid subjecting patients to an operation—which in those days was regarded as risky—unless there was clear evidence of infection of the sinuses, that he devised the method of obtaining suction samples from suspected sinuses, especially the sphenoidal. By investigations in the post-mortem room he had found that it was easy to enter the sphenoidal sinus directly through the anterior wall. While in many cases there was no evidence of infection, on culture of the material, in others the evidence was definite. Then there arose the question of contamination, and he had cytological examinations made, because if there was evidence of inflammatory reaction in the sinus from which the sample had come, it was evidence that the organisms obtained on culture were not contaminations.

Organisms were often present in the lymph-vascular spaces in the submucosa, and these organisms and their toxins frequently spread through the lymph spaces. Hence continuity was not by surface infection, but by the lymph and the vascular connexions. It was always important to get down to the parent infection, which usually continued to dominate the case, and whatever was done to subsidiary foci, the case would not be cured so long as the original or parent infection remained virulent. Probably the majority of cases had started in early life and had then become established. He believed, more and more, that many of the cases looked upon as examples of toxic reaction were really associated with the actual presence of organisms, whether in the sciatic nerve or in the eye.

DISCUSSION ON OBSTRUCTIONS OF THE TRACHEA

OPENING PAPERS

I.—By Lionel Colledge

THE causes of tracheal obstruction can be divided into: (*a*) extrinsic lesions which cause compression of the trachea; and (*b*) intrinsic diseases in the tracheal wall itself.

In the first group are a large variety of conditions, such as mediastinal tumours, enlarged glands, and aneurysms. The most common in this group are goitres and cancers of the œsophagus. In the case of benign goitre the indication is clear; that enough of the goitre—whether in the neck or intrathoracic—should be removed, to relieve the pressure on the trachea. The real difficulty is presented by the dyspnœa which is caused by malignant goitre, and is often accompanied by paralysis of the vocal cords. The same often applies to œsophageal cancers which give rise to this kind of complication. In malignant goitre, whether the cords are paralysed or not, no attempt should be made to do tracheotomy. I have done so on one occasion, although in order to reach the trachea it was necessary to cut through the growth. The opening of the trachea did not give the patient much relief, the bleeding could not be controlled properly, and the patient succumbed in twenty-four hours from blood escaping down the trachea. Very much the same applies to attempts to relieve the obstruction by Koenig's tubes, long flexible tubes which are intended to pass down through the obstruction. The trachea is so much covered by the growth that there will probably be the same trouble, although the plan is to open the trachea higher up. Crile suggested that relief might be obtained by decompression of the neck from dividing the sterno-thyroid and sterno-hyoid muscles, so that the tumour would be allowed to expand outwards. But often in such cases the malignant disease has invaded the muscles, and they are infiltrated and fixed by the growth so that it is not likely that any large measure of relief is to be obtained in this way.

Another patient was a woman who had an enormous goitre which reached up under her ears; probably it was sarcomatous, for it was accompanied by bilateral abductor paralysis. Acting on previous experience, the advice was given that it would be better to do nothing, with the result that she went elsewhere to get other advice. Mr. Musgrave Woodman treated the patient with a radium collar. That caused the goitre to shrink, and the movement returned to the cords, and the patient obtained complete relief for several months. In such cases I should advise, in future, not a radium collar, but treatment by deep X-rays, because in that way it would be possible to cover a larger area with the irradiation.

The late Sir Felix Semon, in one of his writings, gives the warning that a surgeon undertaking tracheotomy for double abductor paralysis must be on his guard against encountering another obstruction lower down, which prevents the tracheotomy from affording any relief to the breathing.

He relates the case of a patient who had a large goitre and at the same time carcinoma of the œsophagus which caused double abductor paralysis. The patient died during the operation of tracheotomy and it was found afterwards that an abscess had formed between the œsophagus, the trachea and the right lobe of the thyroid gland. The pilot of the cannula had passed through the trachea into the abscess. I have encountered this myself, in a patient who was admitted with dysphagia and dyspnœa; the cords were paralysed and I found that the tracheotomy gave no relief at all, because, whatever manipulation was undertaken, the tracheotomy tube slipped into the œsophagus. At the autopsy it was found that the septum between the trachea and the œsophagus was so much destroyed by the growth that the only possible track for the cannula was into the œsophagus.

Another somewhat similar case was instructive because it almost led to serious error. The patient was a sailor, who appeared one day with dysphagia and dyspnœa, and at first it was impossible to decide whether the symptoms were due to aneurysm or to malignant disease of the œsophagus. After further examination it was established that the diagnosis was malignant disease of the œsophagus, but I found it difficult to persuade the physician that in this case tracheotomy would be useless. The cords were not affected, but there was pronounced dyspnœa. When the case came to autopsy it was found that the perforation into the trachea was immediately above the bifurcation.

Disease of the tracheal wall itself causing stenosis is rare. We may encounter here syphilis, tuberculosis, and new growths. I have no experience of rhinoscleroma. The syphilis occurring in this situation, apart from syphilis of the larynx, seems to respond very well to antisyphilitic treatment, without leading to stenosis—as it is apt to do in the larynx if it is much advanced before treatment is begun.

Some years ago a woman came to the Golden Square Hospital with pronounced tracheal dyspnœa and obviously in great distress. On examination with the mirror, a concentric constriction was visible below the cords, appearing as a series of shiny rings, exactly resembling the picture of stenosis of the trachea from syphilis depicted in Morell Mackenzie's book. The patient responded very quickly to antisyphilitic treatment, and after a few days she felt so well she discharged herself in order to attend a fancy-dress ball.

Tuberculosis of the trachea, apart from tuberculous laryngitis, is very rare, but I have recently been called upon to treat a patient for this condition. His age is now 56, and he had old-standing pulmonary tuberculosis and, a few years ago, some laryngeal disease, which may have been tuberculous, but this was never settled. Still later a pharyngeal ulcer on the posterior wall yielded to light treatment. Both had completely healed, the pulmonary disease being quiescent.

In this patient a tracheal stenosis gradually supervened until he was brought to me one morning in some distress with decided tracheal stridor. The larynx was normal but a grey swelling could be seen in the trachea below. At the operation in the afternoon of the same day the trachea was difficult to define owing to the perichondritis and adhesion to the thyroid gland. Opening the trachea gave no relief owing to the amount of swelling in the lumen, but a Durham's tube passed through this narrow portion and restored a free airway. The subsequent history was one of continual struggle against the spread downwards of the stenosis and against obstruction from the formation of thick tenacious masses of secretion. This difficulty was no doubt aggravated by the destruction of the ciliary lining. All sorts of medication and sprays and tubes of varying calibre and length were employed with temporary success, until at the end of six months the situation of the patient became intolerable from the difficulty in keeping the airway clear and from the slowly increasing stenosis, even when clear. In spite of this, and of a stiff knee from old tuberculous arthritis the general state remained good. He was then seen by Professor Soerensen who recommended resection of the trachea as the only possible hope of giving relief. This was carried out on the following day by withdrawing the tracheotomy cannula and inserting temporarily a flexible spiral tube. The lowest part of the larynx and about $2\frac{1}{2}$ inches of the trachea were removed and skin flaps turned inwards to line the defect. The portion removed was necrotic but microscopic examination revealed well-developed giant-cell systems and tubercle bacilli. During the process of healing a variety of tubes had to be devised to suit changing conditions, but finally with a large Jackson's tube, 4 inches long, which has a window on its upper surface opposite the lower aperture of the larynx the patient is comfortable, speaks with a good strong voice, and can walk a couple of miles in spite of his stiff knee.

A possible alternative was suggested by a proposal which originated with

Professor Gluck, and was founded upon an experiment of Dubois-Reymond. If the thigh of a duck be amputated, the bird can breathe through the stump of the femur when the trachea is obstructed, because there are air sinuses in the bone. It was suggested that this retrograde breathing[1] might be established in man either by bronchotomy or by a lung fistula. An opening can be made directly into a bronchus after opening the chest wall by a resection of the fifth to the eighth ribs, or alternatively a lung fistula may be established by an operation in two stages. In the first stage, the costal and pulmonary layers of the pleura are united by stitching them together without producing a pneumothorax. In the second stage, the lung tissue is incised and the opening followed back into the lumen of a bronchiole and so a bronchus reached large enough to allow retrograde breathing. Professor Soerensen, however, tells me that the dangers and difficulties are so great and the results so disappointing that he does not consider this method of relief to be of much value.

Primary tumours of the trachea are rare, and it is said that sarcoma is at least as common here as carcinoma. I saw in 1914, at the clinic of Professor Gluck, a man, aged 37, in whom a tracheal carcinoma had been partially removed endoscopically, and when the stenosis recurred the trachea had been resected from the lower edge of the larynx almost to the bifurcation. Except for paralysis of the left vocal cord, the larynx remained normal, and by the aid of a rubber tube connecting the larynx with lower end of the trachea, he could speak with a voice which was only slightly hoarse. This man was able to earn his living as a waiter in Berlin, and I learnt his subsequent history years after from Professor Soerensen. He remained well for seven years after the operation, and then the mediastinal glands enlarged. This caused fresh obstruction and in the end he drowned himself.

The first diagnosis made in these cases is, almost always, asthma. This was so in a woman who came into St. George's Hospital under one of the physicians. There was a tracheal tumour in the upper third of the trachea, where the greater number are situated. This appeared to afford an opportunity for such an excision, but the woman said all she wanted was the diagnosis, as she intended to undergo Christian Science treatment, and she took her discharge.

I have seen recently and treated a case of sarcoma of the trachea, in a man aged 40, who, in the late summer of 1934 had an attack of asthma while playing tennis. Three weeks at the seaside was prescribed without improvement, and a lesion below the cords was then observed. The report on a piece removed was papilloma, and a laryngofissure followed by diathermy was performed. This gave relief for ten days only, when it became necessary to reintroduce the tracheotomy cannula. It was then observed that the cords were not moving and that the trachea was obstructed. The patient was then referred to me with the comment that the fixation of the cords and the tracheal obstruction were probably due to the effects of diathermy.

I found on examination that the cords were not approximating, although the left cord was still moving, and below the larynx there was a round grey swelling like the top of a bullet, completely obstructing the trachea. There was therefore total loss of voice, causing much concern to the patient.

A portion of the mass was removed and drew varied opinions from different authorities on pathology, but it was undoubtedly a round-celled sarcoma. A coincident enlargement of the thyroid gland was most probably due to sarcomatous invasion from the trachea.

I therefore reopened the larynx and continued the opening down the front of the trachea to the tracheotomy tube, cutting away the front part of the tracheal ring. The trachea was crammed with growth which was scraped away with a spoon, and a cartilaginous sequestrum of the cricoid plate, the size of a threepenny piece, was removed. A rubber bougie was inserted into the trachea from the cannula up into the

[1] "Handbuch der Speziellen Chirurgie." Katz und Blumenfeld. Leipzig, 1932, p. 189.

larynx and fixed in position with a couple of silver wires and the wound was closed. The tracheotomy tube was replaced by one of vulcanite, and Mr. Carter Braine gave an intensive treatment of eighteen exposures of deep X-rays which caused the tumour to melt away. At the same time the enlargement of the thyroid gland disappeared.

A few days after the completion of this treatment the wound was reopened and the bougie removed. The patient could then breathe freely, the tracheal lining was smooth, and there was no trace of growth. After an interval of one month the deep X-ray treatment was repeated by Mr. Carter Braine. The tracheotomy tube was then withdrawn, leaving the patient with a good airway and a strong rough voice. The fixation of the right vocal cord remains.

(II) By F. C. Ormerod.

The excuse for this paper lies in the fact that in the museum of the Brompton Hospital there are examples of almost every type of tracheal obstruction. I am indebted to Dr. Atkin, the Director of the Pathological Laboratories, for his help in selecting the cases and to my colleagues for permission to use them.

It is not proposed to include in this summary cases due to inhalation of foreign bodies and, when these cases are eliminated, the lesions arising within the lumen of the trachea become very few. There is, however, a specimen at Brompton Hospital

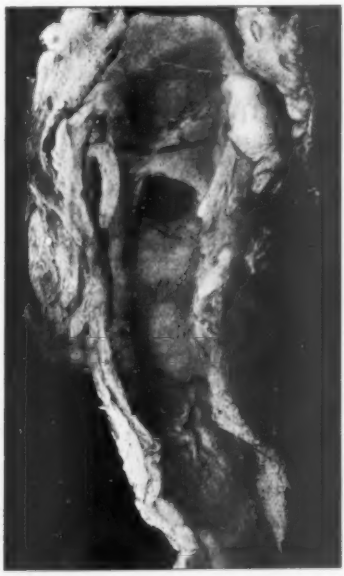


FIG. 1.—Specimen showing perforation of trachea by ulceration of tuberculosis gland. Gland lying free in trachea.

of a pre-tracheal gland which became enlarged, eroded its way through the anterior wall of the trachea, and fell down to the bifurcation where it lodged. The patient was in one of the wards, got out of bed, fell on the floor and died. There are several similar cases in which such a gland has lodged in a bronchus but these do not come within the scope of the present discussion. The photograph of this specimen (fig. 1) shows the place of lodgment of the gland and its portal of entry.

Such cases should be rare, but the fact that these glands are found in the bronchus from time to time shows that they may be encountered occasionally in the trachea.

There are two main groups of obstruction due to lesions arising in the wall; cicatricial stenoses and new growths. Cade and Brette [1] described a syphilitic stricture of the trachea, 4 cm. long and of the calibre of a goose-quill, in a man aged 37, who had contracted syphilis at the age of 18, and who had various other tertiary syphilitic lesions. Lynah [2] describes a case of stenosis following the wearing of a tracheotomy tube, and many others of a similar nature have been published, especially in the Italian literature. In this country Howarth [24] and Tilley [25] have recently recorded examples. Sargnon and Wertheimer [3] record a case in a woman aged 24, who had had intubation and tracheotomy for diphtheria at 3½ years and a laryngostomy at 5 years. She was cured by means of diathermy. Mathers [4] described a case of stenosis following a bullet wound just below the larynx.

FIG. 2.—Specimen showing syphilitic ulceration of the trachea with stenosis.

In the museum at Brompton Hospital is a specimen of a trachea from a tuberculous patient (fig. 2). There is scarring and stenosis in the lower part of the trachea and in the catalogue it is described as probably due to syphilis. There does not appear to be any real evidence as to its syphilitic nature, and the specimen belongs to the days before the Wassermann reaction. There are several similar specimens, all from tuberculous patients, but it is very rare to find tuberculous lesions—and particularly tuberculous stenosis in the trachea. It is possible that these cases may be syphilitic in origin.

New growths of the trachea may originate in the tracheal wall, or may invade it from the thyroid and thymus glands, from the œsophagus and from the upper lobe of the lungs where they originate in a small bronchus and often reach the lumen of

the trachea by direct infiltration before they emerge from the main upper lobe bronchus.

Baratoux [5] has reviewed the literature of tracheal tumours. He states that there occurs one tracheal tumour to every hundred laryngeal tumours. In the larynx one tumour is malignant to seven benign, but in the trachea the proportion is one to three. He says that the tumours occur twice as often in men as in women, and in this he is confirmed by Theisen [6] and Carnevale-Ricci [7]. These writers give 50 to 60 as being the common age for the occurrence of such tumours. Theisen states, and is confirmed by other writers [7, 9], that these tumours occur in the uppermost and lowermost parts of the trachea, but rarely in the middle. Baratoux considers that metastases are rare.

Symptoms of tumour in the trachea are dyspnœa and a feeling of pressure behind the sternum, or in the region of the larynx, according to the site of the lesion. There may be blood-stained sputum and stridor. The stridor is usually both inspiratory and expiratory, as opposed to the inspiratory stridor of laryngeal obstruction and the expiratory stridor of bronchial obstruction. Heymann [8] says that cases of tracheal obstruction are often treated as asthma. Chevalier Jackson's aphorism "all is not asthma that wheezes" is here appropriate.

The voice is only affected when the recurrent nerves are involved, and this involvement is surprisingly uncommon. Dysphagia is described as occurring when the œsophagus is infiltrated, but probably the lesion often begins in the latter organ in such cases. Of tumours growing into the lumen of the trachea, and probably originating in the wall, there are a number of examples in recent literature.

Dundas-Grant [10] reported a case of masses of papillomata in the trachea, and there is a specimen at Brompton Hospital of papillomata which have spread into the trachea from the larynx. James Adam [11] reported a case of a fibroma immediately below the larynx, and Herbert Tilley [12] one of a papillary granuloma just above the bifurcation of the trachea in a man who had been gassed. Watson-Williams [13] described a case of sarcoma in the upper part of the trachea in a girl aged 6, and James Adam [11] one of endothelioma at the level of the fourth ring.

Of the carcinomata, Wolfgang Tiling [14] described a case of basal-celled carcinoma which reached from below the glottis to the seventh ring of the trachea. Feuchtinger also reported a carcinoma in the upper part of the trachea.

Neilson [15] recently wrote a detailed description of a case of carcinoma of the lower part of the trachea which he was able to observe for some time, and eventually to examine histologically. The growth resembled very closely the typical bronchial carcinoma, and was thought to have originated in the mucosa of the trachea. There were no lesions in the bronchial tree or lungs. James Adam [11], in the paper mentioned already, reports two patients with epithelioma at the lower end of the trachea. At autopsy extensions into the lung were found. It is possible that these growths were originally carcinomata of an upper lobe bronchus which, after infiltrating the parenchyma of the lung, penetrated the wall of the trachea and so became intratracheal tumours. Such cases are observed at Brompton Hospital.

Carnevale-Ricci [7] reported a case of endothelioma immediately below the larynx and two cases of epithelioma which caused death, in one case from dyspnœa, and in the other from septic pneumonia. In the first of these two cases the œsophagus was involved, and it is possible that it was originally an œsophageal growth which had invaded the trachea.

Such a case was observed over a considerable period at Brompton Hospital. A sailor, aged 57, was admitted suffering from severe dyspnœa. The larynx was normal, and no cause of the obstruction could be seen in the laryngeal mirror. A low tracheotomy was performed, and the upper edge of a tumour was then seen. It apparently sprang from the posterior wall of the trachea and almost filled the lumen. Dyspnœa was so severe that an intratracheal catheter was inserted through the

tracheotomy wound and past the stenosis. This catheter had to be retained for several weeks, but on two occasions radon seeds were inserted into the tumour and caused enough recession to enable the patient to dispense with the tube. At a later stage dysphagia was observed and endoscopic examination revealed a growth in the œsophagus, opposite to the tracheal tumour. The patient eventually died of septic bronchopneumonia. Autopsy showed an extensive growth in the œsophagus and one of slightly smaller dimensions in the trachea (fig. 3). Histological examination strongly suggested that the growth was from the first an œsophageal carcinoma, but the tracheal signs were obvious for many months before there was any suggestion of œsophageal implication.

FIG. 3*a* —Tracheal aspect.

FIG. 3*b*.—Œsophageal aspect.

Carcinoma of trachea—extension from œsophagus.

Vacher and Denis [16] describe a case of a tumour in the upper part of the trachea which, on removal, was found to be thyroid tissue and contained cysts. One of the cysts suggested that the tumour arose from a thyroglossal remnant.

Obstruction of the trachea from causes arising outside it is the most common type. The stenosed trachea from long pressure from an enlarged thyroid is a common experience. Scott Ridout [17] reported the case of a boy of 16 with enormous hypertrophy of both thyroid and thymus, which had caused absorption of practically all the cartilaginous rings of the trachea. Gardiner [18] recorded a case of malignant disease of the thyroid gland, with stenosis, and Stannig [21] one of cystadenoma. Dundas-Grant [19] described the case of a patient with phthisis who had a swelling

of the anterior wall of the trachea with stridor. He eventually coughed up a piece of bone and recovered. Bettin [20] reported a large saccular aneurysm which pressed on the lower part of the trachea and caused dyspnœa. The writer has had the opportunity of examining two similar cases with the bronchoscope at Brompton Hospital. In one there was a fusiform aneurysm of the left common carotid pressing on the left wall of the trachea and causing a moderate degree of obstruction. In the other there was a saccular aneurysm of the arch of the aorta causing a flattening of the trachea in an antero-posterior plane. The pulsation of the blood-vessels was very obvious on each occasion, both patients survived bronchoscopy and were able to return home. [Three other Brompton Hospital cases were illustrated. One showed

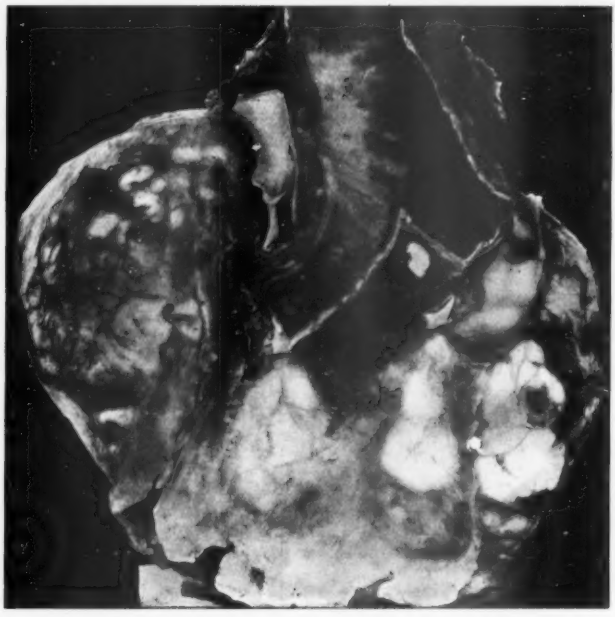


FIG. 4.—Specimen of lymphoma of mediastinal glands compressing trachea from right side.

flattening of the trachea from behind forwards by an enormous lymphoma of the mediastinal glands (fig. 4). A second showed a stenosis of the lower part of the trachea due to an endothelioma of the thymus (fig. 5). The third case was that of a retrosternal goitre in a woman, aged 59, who had very severe dyspnœa, but who made a complete recovery after removal of the thoracic portion of the thyroid by Tudor Edwards. This patient's left recurrent nerve was paralysed and the case was thought to be one of carcinoma, but histological examination showed the growth to be a simple adenomatous goitre with degenerative changes.]

Würster [22] records a case of an ingrowth, through the anterior wall of the upper part of the trachea, of a parenchymatous goitre, and Metzkes [23] related a similar case but one in which the thyroid enlargement was malignant.

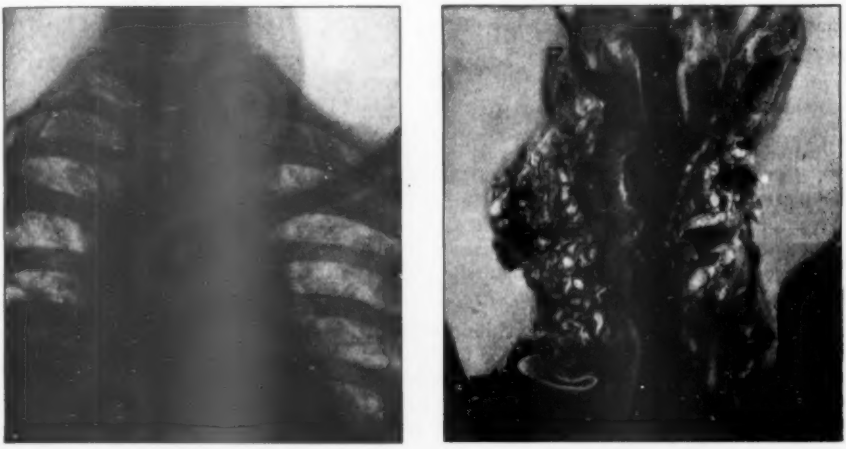


FIG. 5.—Skiagram showing endothelioma of the thymus with compression of trachea from left side.

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Harold Kisch said he had only had one case of carcinoma of the trachea and that was four and a half years ago. The growth was an adeno-carcinoma. A swelling could be seen in the trachea, extending apparently from the second or third ring to the fifth. A low tracheotomy was performed, and he saw the lower end of the growth. An opening was made higher in the trachea and needles of radium were threaded in. The growth disappeared, and periodically a tube was passed for examination. He was hoping to show the case before long as a five-year cure, but three weeks ago the patient complained of abdominal symptoms and he now had a large

mass of growth in the abdomen. No recurrence could be seen in the trachea or the neck.

E. A. Peters related two War cases. In the first there was a closed gun-shot wound at the base of the neck; the patient was cyanosed and the cricoid was close to the sternum. At first it appeared that a rapid laryngotomy and the passage of a Koenig's tube would be necessary. Fortunately, however, opening the old wound allowed a collection of pus to escape, with immediate relief.

In the second case a bullet was located, by a skiagram, in the hyoid region but could not be localized by laryngological examination. A general anæsthetic was given, and unfortunately the patient died without recovering consciousness. Post mortem a ·303 bullet was found across the carina, blocking both bronchi. If the patient had been sitting up when the bullet entered the trachea, it would have dropped into the right bronchus.

Walter Howarth said that he would mention one of his own cases which illustrated a point that Mr. Ormerod had mentioned, namely that sometimes, though the lesion might be in the œsophagus, the symptoms were mainly tracheal. The case had occurred a long time ago. The patient, a young girl, had been sent to him because of some dyspnœa and a very persistent cough. On examining the air-passages he had found very little. On passing the œsophagoscope he found a gumma, high up on the anterior wall of the gullet and involving the trachea. Probably there was some leakage through, though he could not detect any. Under antisyphilitic treatment the condition cleared up.

Another interesting case was one which he had under observation at the present time—that of a young man, aged 30, who for about eight months had had stridor, which was greatly increased when he put his hands up over his head. Just above the clavicle a hard mass could be felt. The X-ray examination was somewhat indefinite, but showed a slight shadow just below the level of the sternum, and this compressed the trachea to the right. The bronchoscope showed a definite bulge of the tracheal wall. He had not yet investigated it further. He was wondering whether it was an endothelioma of the thymus, or whether it was an upper lobe carcinoma of the lung, pressing upwards. He did not think it was a retrosternal goitre.

Sydney Scott said that since the Great War he had lost three personal friends from conditions such as were now being discussed.

There must be in such cases an upper bronchial and a lower bronchial compression; he did not think a growth in the lungs alone could produce such a condition.

Mr. Colledge had referred to attempts made to pass a tube into the distal opening of the bronchus for the relief of this most distressing dyspnœa. Even if the ultimate outlook of life were bad, this might relieve the patient of the dreadful distress, which in some cases persisted for months. He felt that the possibilities of approach through the chest into the bronchi had not yet been exhausted.

W. Stirk Adams said, that in Mr. Woodman's absence, he would give the further history of the second case which Mr. Colledge had mentioned. The patient had continued well for nine or ten months after the first application of the radium to the large mass in the neck. She had then had a recurrence of the tracheal obstruction, and re-entered hospital. At that time there was, in the base of the neck, a small swelling on both sides. Another external application of radium had been given, and the stridor had rapidly disappeared. This improvement had lasted a few months. Then a further recurrence of the tumour had taken place in the base of the neck and upper part of the chest, and ultimately the patient had died from this cause.

[*June* 14, 1935]

OTOLOGICAL SESSION

Chairman—E. A. PETERS, F.R.C.S., President of the Section of Otology

The Operative Treatment of Vertigo

By W. M. MOLLISON, M.Ch.

The operative treatment of Ménière's symptom-complex. — We know that such diverse causes as wax in the ear and acoustic nerve tumour can give rise to the syndrome deafness, tinnitus and vertigo, generally in one ear only.

The first step in treatment therefore is to make sure that the external and middle ear, including the Eustachian tubes, are normal. To show how important it is to eliminate the middle ear as the cause of vertigo the following case is quoted:—

A woman aged 30 suffered from vertigo from time to time for a year, and was deaf in the right ear. Inflation of the tube was practised on several occasions but without effect; the patient was examined exhaustively in hospital and no organic disease found in the central nervous system or elsewhere: the labyrinth was functional and the deafness was of high degree. Vertigo persisted for two years. Finally, operation was contemplated but two days before a final decision was to be made, the patient heard a sharp noise in the right ear and afterwards heard normally! This probably means that the tube was never properly inflated.

A neurologist should be asked to eliminate any lesion of the central nervous system—especially cerebellar, and cerebello-pontine angle neoplasms, and acoustic nerve tumours, not forgetting the possibility of migraine.

Toxic causes should be sought in the tonsils, teeth, sinuses and other possible sources of infection. Syphilis must be excluded also.

There is then left the group of patients, usually over the age of 40, who have unilateral deafness of high degree, tinnitus and vertigo. The vertigo generally comes on in attacks lasting from a few minutes to some hours and often resulting in vomiting or nausea. These attacks occur over a long period, several years in some cases; they may only occur once or twice a year at first, becoming afterwards more frequent, and of greater or lesser severity; in addition, the patients may be thrown to the ground without warning. As a result the patients are unable to go out unless accompanied by a friend and are obliged to curtail their activities; some even remain indoors for months on end and some remain in bed. All patients complain of unsteadiness on their feet after an attack and some complain of "swimmy" feelings all the time between the attacks.

It has been stated that the vertigo stops when the affected ear becomes quite deaf; this is not always true. Perhaps the statement dates from Charcot who wrote that "patients experience sensations of vertigo and buzzing in the ears only so long as the deafness is partial and lose these symptoms as soon as it becomes complete."

When medicinal treatment has failed operative treatment may be considered and in my experience the comparatively simple procedure of opening the external semicircular canal and injecting absolute alcohol gives very good results.

My series—30 in number—are, for the most part, cases of Ménière's syndrome of internal-ear origin, but include three cases of vertigo after radical operation, in which the vertigo persisted though the cavity was well epithelialized. Mr. R. J. Cann, when my assistant, operated on four or five of the cases.

Some years ago Mr. Sydney Scott found that injection of absolute alcohol into labyrinths of pigeons was a simple and efficient means of destroying labyrinthine

function. It struck me that that plan might be applied to man in order to destroy the function of the semicircular canals. The mastoid antrum is exposed. The canal is identified and is opened by means of a narrow gouge; ½ to 1 c.c. absolute alcohol is injected anteriorly in an endeavour to reach the vestibule. The wound is sutured. For two to ten days the patient is very giddy, on account of unbalanced action of the opposite labyrinth; he then begins to be able to sit up, and soon is able to walk. The recovery time varies very much with the type of patient; phlegmatic men walk on the fourth day or sooner.

Recently Hautant reported a number of cases in which he had operated for vertigo. He divided his cases into two groups. The first consisted of cases of healed chronic suppuration, 30 in number, in which he had obtained complete and permanent cure. The second group consists of cases with "sclerosis of the labyrinth" (no doubt Ménière's syndrome of internal ear origin), 13 in number; of these, seven have been completely successful; in four the attacks of vertigo diminished in frequency and severity; in the remaining two cases, no improvement followed.

The number of cases in Hautant's first group (30) strikes one as very large. I have only felt justified in operating on four cases and one of them was unsuccessful; Mr. McGibbon has operated successfully on one in his series.

Results.—There has been no sign of labyrinth infection in any of the cases. Of my thirty patients, twenty-eight have been traced, twenty-two have been cured of the attacks of vertigo, three were improved, while three were quite unaffected, and their vertigo continues as before, although the function of the labyrinth was successfully destroyed.

The same operation has been applied to cases of vertigo persisting after the radical mastoid operation. The old wound was opened and the external canal was identified and after thorough cleansing with ether, the opening of the canal and injection as above described was carried out. To cover the hole in the canal a flap of temporal muscle was turned down into the cavity.

The operation is only performed in cases of vertigo plus deafness and preferably those in which deafness in the affected ear is of high degree and the hearing of the opposite ear is good. Tinnitus previously present persists.

There may be no virtue in the injection of the alcohol. Certainly cases have been freed of their vertigo by simple opening of the external semicircular canal; but it was felt that the alcohol would destroy the function of the canal system and vestibule.

All the patients followed up have been recently seen or heard from in letters, or are known about; some of the results are perhaps too recent to be spoken of as cures.

It has been suggested that for Ménière's syndrome—a condition that has no mortality—operation is scarcely justifiable and should only be advised in extreme cases. But a condition that may, and often does, completely check all ordinary activity, even housework (as I have seen in at least two cases) and causes serious economic difficulty—because no man can justifiably be kept at work where attacks of vertigo would bring great risk of life, e.g. in scaffolders, or involve risk to others, e.g. in motor drivers—appears to me to justify an operation which does away with his disability. Most of the patients are very grateful for being rid of the attacks.

Mr. McGibbon, who employed the same procedure, kindly allows me to quote the results he had obtained in nine cases. In seven the result was good; in one of these the canal was injected on account of continuous vertigo after a radical mastoid operation. In one case the vertigo ceased, but the man complained of the tinnitus which persisted, and in another the patient developed subacute combined degeneration of the cord.

RESULTS OF OPERATION ON THE EXTERNAL CANAL FOR VERTIGO

	Cases	Cure	Fair	Bad
Hautant				
(*a*) Old healed suppuration	30	30 = 100·0%	—	—
(*b*) Ménière's syndrome	13	7 = 53·8%	4	1
McGibbon	8	7 = 87·5%	1	—
Author	30	22 = 73·0%	3	3

The following summarizes the rules one follows in choosing cases:—

(1) Exclude all forms of middle-ear affection, especially mild degrees of Eustachian tube obstruction, i.e. treat the catarrh.

(2) Exclude syphilis.

(3) Exclude all organic disease of the central nervous system—cerebral tumours and tumours of the acoustic nerves; affections of the medulla, e.g. bulbar paralyses.

(4) Exclude otosclerosis.

(5) Exclude in young persons all foci of toxic infections—teeth, sinus suppuration, tonsils.

(6) The cases left after these exclusions may be considered due to affection of the internal ear and their treatment consists: (*a*) In giving various drugs, e.g. luminal, gardenal, bromides, quinine, potassium-iodide. (*b*) When these have failed, the question of operation on the labyrinth should be seriously considered, and then only if the unaffected ear hears reasonably well.

It is evident that the cases coming to operation will not be large in number; but those who submit to operation may be told that the operation is entirely without risk, and that the probability of cure of the vertigo is very great.

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Four Cases of Vertigo treated by Operation.—W. THACKER NEVILLE.

I.—L. S., male, aged 31, motor mechanic. 10.2.35. *Left ear*: No pain; pulsating pus; perforation and granulation tissue in superior posterior quadrant; tinnitus; deafness; vertigo. Skiagram—"Left mastoid cells completely obscured, suggestive of chronic mastoiditis." Complains of pain in the occipital and left temporal region.

28.2.35. Patient discharged as middle-ear condition was healed.

2.4.35. Vertigo persisting.

3.4.35. Exposure of left posterior semicircular canals and injection of alcohol.

30.4.35. Spontaneous nystagmus absent. Left ear: Ice water ½ oz.—no nystagmus, no giddiness. Ice water 4 oz.—similar results.

21.5.35. *Final result*: No real giddiness, just a sensation of swaying at times. Tinnitus present.

II.—E. D., male, aged 40. Labourer. Chronic right middle-ear suppuration six years ago. First attack of vertigo twelve months ago, following influenza, when he had sensation of external objects rotating. Since then he has suffered from deafness, tinnitus and vertigo.

15.5.34. Radical mastoid operation on account of middle-ear condition; right external and superior semicircular canals opened, alcohol injected.

2.6.34. Discharged. Vertigo and tinnitus cured.

III.—M. B., aged 55, seamstress. 27.9.32. *Right ear*: Membrane intact; tinnitus; deafness; vertigo; no discharge; no pain.

18.4.34. Opened posterior superior semicircular canals and injected alcohol.

Immediate result: Abscess in right shoulder. Lateral sinus exposed (normal).

Final result: Tinnitus and vertigo absent.

In three of these four cases the operation has been successful in that the patients are cured of the vertigo. In the fourth case the patient (2.5.34) had an attack of vertigo and vomiting on 17.3.35 and of vertigo and nausea 21.5.35. The canals have been destroyed, as shown by the absence of vertigo and nystagmus on application of the cold-water test. As there was a middle-ear discharge twenty-eight years ago, there may have been an ascending degeneration of the vestibular nerve. Tinnitus which has lasted for longer than a year is difficult to cure, even if the cochlea is destroyed and this is presumably because of an ascending degeneration of some of the fibres of the cochlear nerve. In the same way, perhaps, it may be difficult to cure vertigo of long duration for the same reason.

IV.—F. R., male, aged 40, cobbler. 2.5.34. Complained of vertigo and vomiting for four months (intermittently). Had discharge from left ear twenty-eight years ago. Tinnitus.

16.5.34. Right external semicircular canal opened and alcohol injected. Radical mastoid operation.

2.6.34. Discharged. Vertigo gone. Tinnitus present.

17.3.35. Sick and giddy.

June 1935. *Right ear, caloric test*: 24 c.c. ice water, no nystagmus even in optimum position. 60 c.c. ice water, no giddiness, no nystagmus.

Left ear, caloric test: Tympanic membrane present and retracted. 24 c.c. ice water, slight giddiness. Nystagmus active in optimum position. 40 seconds +.

Aural Vertigo: Alcohol Injection through the Oval Window.—A. J. WRIGHT.

Mrs. M., aged 52.

Left-sided tinnitus since the age of 18. Attacks of vertigo with vomiting for five years, with, on one occasion, an epileptiform attack with loss of consciousness. The right ear is normal, but the left showed a moderate degree of perceptive deafness, the conversation voice being heard at three feet.

30.5.35. Under general anæsthesia, 1 c.c. of absolute alcohol, coloured with methylene blue, was injected by puncturing through the intact membrane and footplate of the stapes.

Discussion.—Mr. SYDNEY SCOTT said that it had been his misfortune, in his own early cases when he had injected alcohol, to meet with two types of mishap, and these had made him more and more conservative.

One patient so treated developed facial paralysis—not from traumatic injury of the facial nerve—and it took three years to recover.

A more tragic case was that of a young woman with very troublesome vertigo. He operated upon the labyrinth, and injected alcohol, and though the ear was quite free from sepsis at that time, a pneumococcal infection of the middle ear developed—no doubt from the Eustachian tube; this spread to the meninges and the patient died. Hence he considered the operation was not free from risk.

The PRESIDENT said that decompression of the perilymph, which was carried out by his (Mr. Peters') operation, and decompression of the endolymph by Portmann's operation, might be tried in suitable cases, but Mr. Mollison's held the field where the functions of the ear were negligible.

He would like to hear from Mr. Mollison how far he considered the 1 c.c. of alcohol went when injected, and he asked also whether in every one of Mr. Mollison's cases the cochlea and the semicircular functions were completely ablated.

Mr. MOLLISON (in reply) said he used a lachrymal syringe and 1 c.c. of alcohol. When the needle was placed into the anterior opening of the canal he did not pass it in more than 3 or 4 mm., and the fluid was injected under a little pressure. He believed that a good deal of the fluid came out again; only a few minims entered the vestibule. The effect of alcohol on living tissues was very intense, and probably two minims was enough to destroy the sensitive lining of the vestibule.

Specimens of Handwriting before and after Radical Mastoidectomy. Notes of Case.—E. H. RICHARDS.

The patient, a woman, aged 44, a school and music teacher, had for about fifteen years, had continuous vertigo following bilateral conservative mastoid operations. Complete relief of all vertigo followed left radical mastoid operation for continued suppuration, when a piece of bone-chip was found in the region of the foramen ovale covered by a tough fibrous diaphragm. Unfortunately the chip was lost. No cholesteatoma found; absence of malleus and incus.

Before operation.—Foul left-sided discharge; hissing tinnitus on left; no nystagmus but patient is unable to look to right on account of increased vertigo; subjective

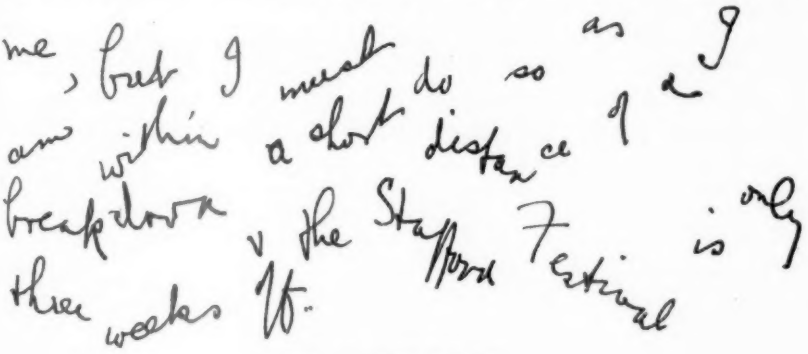

FIG. 1.—Before operation.

rotation to left, "floor seems to rise"; patient tends to fall forwards; past-pointing to left with left arm only and very marked positive fistula sign on left. Right ear dry.

	Right	Left
Whisper	12 inches	Nil
Conversation ...	Over 18 feet	At meatus
Lower limit ...	256 d.v.	512 d.v.
Absolute bone-conduction to 512 d.v.		Diminished 10 secs.
Rinne		Negative to 512 d.v.

In a letter written by the patient (see fig. 1, p. 81), the writing shows an interesting attempt presumably to compensate for a swaying type of vertigo.

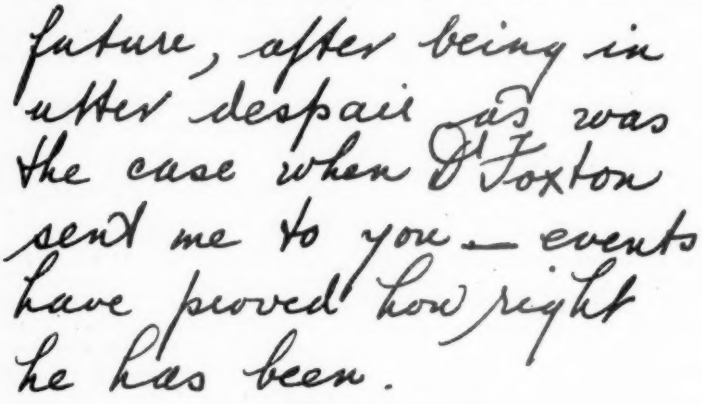

FIG. 2.—Six weeks after operation.

After operation.—Within a few days she was able to do needlework and her writing was normal; there was no further vertigo or past-pointing and no nystagmus. The hearing on the left further diminished. She complains of occasional loss of memory and that when she has a "cold" there is an echo to certain musical notes which is "flat" and delayed. Otherwise she has remained well for three years.

The following were also shown:

Two Cases of Abscess of the Left Temporosphenoidal Lobe Secondary to Otitis Media; Operation; Recovery.—E. WATSON-WILLIAMS, F.R.C.S.

Cerebellar Abscess; Drainage; Recovery.—E. MILES ATKINSON.

Specimen: Right Cerebellar Abscess.—E. MILES ATKINSON.

Section of the History of Medicine

President—Sir StClair Thomson, M.D.

[*June* 5, 1935]

English Medicine in the Eighteenth Century

By John D. Comrie, M.D., F.R.C.P.Ed.

The eighteenth century, which popular imagination is apt to regard as dull and uneventful, was in reality a period of great medical, as of great social, progress. Speaking very broadly, the character of English medicine was, in the first part of the eighteenth century, "literary," in the second part "speculative," and in the third "biological." I propose to deal first with the great physicians early in the century; then with the character of general practice; next with the quacks; then with theoretic and scientific medicine of the mid-century; and finally with the additions to clinical medicine towards its close.

The seventeenth century had seen much curiosity regarding the functions of the body. Harvey's discovery belongs to its earlier half, and inquirers like Boyle, Mayow, Hooke, and others had penetrated far into the puzzle of respiration, which had attracted speculation since the time of the early Greek philosophers. In the latter half of that century an amazing field regarding the structure of the body had been opened for future cultivation by the microscopical discoveries of Malpighi and Leeuwenhoek. Most of Leeuwenhoek's discoveries were published by the Royal Society. In botany, Sir Thomas Millington's discovery of sex in plants, and Nehemiah Grew's great work on *The Anatomy of Plants* (1682), had added to the knowledge of vegetable morphology and physiology, and had greatly increased the rational use of vegetable remedies. Thus the eighteenth century opened with a large recent addition to medical science, and there was an avid desire for further inquiry.

Politically and socially, the first twenty years of the eighteenth century show a distinct difference from the remainder, and this had important repercussions on medicine. William and Mary, and later Anne, occupied the Stuart throne, and medicine was still to a large extent that of Wiseman and Sydenham, of Harvey and Boyle. Surgery was rough-and-ready, and indeed it may be said that in England there were only two surgeons of first-class rank in knowledge and skill before the time of John Hunter, whose life's work lay in the latter half of this century; these two exceptions were William Cheselden and Percival Pott. The great surgeons of the period were almost all in France. The names of many great physicians, however, are associated with the time of Good Queen Anne. The great bent of polite society early in the century being towards literature, it was natural that well-known names in medicine should be found among those of the literati. The Sydenham tradition

in clinical medicine was continued by his pupils, Sir Richard Blackmore and Sir Hans Sloane. Blackmore, who was physician to Queen Anne, was well known in his day as a poet, and his poem on *Creation* (1712) was warmly praised by Dr. Johnson. Sir Hans Sloane, who became physician to George II, added a great deal to the botanical knowledge of his time by publishing a catalogue and description of plants found in Jamaica, and by a botanical expedition to the islands of Madeira, Barbados and others. The breadth of his tastes is attested by the founding of the British Museum with the collections that he left. Sir Samuel Garth, later physician to George I and a member of the Kit Cat Club, wrote much occasional verse, but is chiefly remembered for his polemic poem *The Dispensary* (1699). The Royal College of Physicians, moved by the appalling extent to which imposture was practised by quacks upon the poorer classes, and by the high prices charged for medicines, had founded a dispensary for out-patients, which was bitterly opposed by the apothecaries. Garth's poem contains such lines as the following. Speaking of the ignorant, persuasive practitioners, he says:

> "The patient's ears remorseless he assails,
> Murders with jargon when his medicine fails."

He puts into the mouth of the apothecaries who opposed the desire of the College to cheapen medicines, the lines:

> "Our manufactures now they meanly sell,
> And their true value treacherously tell."

John Arbuthnot, the friend and physician of Swift and Pope, was the author of *The History of John Bull* (1712), and was eulogized by Pope as:

> "Friend of my life; (which did you not prolong,
> The world had wanted many an idle song)."

John Radcliffe had a huge practice in London and many scientific interests, but in spite of these he appears to have conducted his practice on the lines which he communicated to Mead, to whom he said: "I'll tell you a sure secret to make you a fortune—use all mankind ill." He was physician to the Princess Anne, but lost this lady's favour by telling her that she was suffering from nothing but the vapours. He is remembered now by his benefactions to Oxford.

Richard Mead, a collector and anatomist, and financier of literary undertakings, became the great medical dictator of his time, and physician to George II. He is celebrated for the quarantine regulations that he imposed to prevent the plague, and for giving his imprimatur to inoculation of smallpox. Seven condemned criminals were successfully inoculated with smallpox in 1721 and afterwards pardoned, the actual inoculations being carried out by a Scotsman, Maitland. After Mead's recommendation the practice became general.

One of the most celebrated inoculators was Thomas Dimsdale, who, in 1768, was invited to Russia to inoculate the Empress Catherine. Taking his life in his hands—for he would undoubtedly have been executed if things had gone wrong—he went to Russia, inoculated the Empress, and later many Russian nobles, with complete success, and was made a Baron and given a fee of £10,000 and a pension of £500 a year for life.

Inoculation thereafter remained the great preventive of smallpox until the discovery of the safer procedure of vaccination later in the century by Edward Jenner. Jenner's vaccination of his son in 1796 brings this basal experiment on immunotherapy into this century, although it is a remarkable fact that practically no further steps in this direction were taken until the researches of Pasteur in the sixties of the nineteenth century.

Mark Akenside was another of the poet-physicians. He practised in Newcastle and afterwards rose to eminence in London, and was physician to St. Thomas's Hospital. He was not popular with his contemporaries, was disliked by Dr. Johnson, was lampooned by Smollett as the doctor in *Peregrine Pickle* and by his inhumanity to his patients in St. Thomas's, "inexpressibly shocked" Lettsom who was a pupil under him. Yet many of his verses in *The Pleasures of Imagination* and elsewhere are of great beauty.

Oliver Goldsmith practised medicine for a short time in London, but can hardly be claimed for medicine. His right to be styled a physician rests chiefly upon the possession of a gold-headed cane and upon the fact that he had spent a winter session at Edinburgh and afterwards a short period at Leyden.

A similar literary and poetic character was to be found in many of the less-known physicians scattered through the country. For example, in the latter half of the century, Erasmus Darwin, while going on his professional rounds near Lichfield, composed such poems as *The Loves of the Plants*, 1789, and *The Temple of Nature*.

The study of medical history in England may be said to have begun with the publication in 1725 of *The History of Physic* by John Freind, who was physician to Queen Caroline. In his preface he says that it was written to occupy some leisure hours, probably when he was languishing in the Tower, from which he was rescued by the intercession of Mead.

The rank-and-file of medical practitioners throughout the country was not of high type. Anyone could set himself up as a general practitioner, and there was no control whatever over medical practice before the Apothecaries' Act of 1815. Medical training in the eighteenth century was almost entirely by apprenticeship to older practitioners, and unless a man wished to become a consultant, or to achieve promotion in one of the services, he rarely troubled to take a degree from one of the universities. The provincial practitioner is well represented by Dr. Burton of York, whom Sterne ridiculed as Dr. Slop in *Tristram Shandy*. The picaresque character of many practitioners is drawn by Tobias Smollett, and persons like Count Fathom who took to medicine when everything else failed, would to-day be regarded as unsavoury members of a noble profession. Smollett was himself a licentiate in surgery, and without doubt his characters are founded on fact, while the *Adventures of Roderick Random* are largely autobiographical. A discussion between Roderick and his principal, Mr. Crab, an old practitioner who had learned his business as an apprentice, is illustrative of the attitude of this type of practitioner. Roderick Random was defending himself by saying: "'Neither am I altogether ignorant of surgery, which I have studied with great pleasure and application.' 'O ho! you did,' says Crab. 'Gentlemen, here is a complete artist! Studied surgery! What? in books, I suppose. I shall have you disputing with me one of these days on points of my profession. You can already account for muscular motion, I warrant, and explain the mystery of the brain and nerves—ha!—You are too learned for me, d——n me. But let's hear no more of this stuff. Can you bleed and give a clyster, spread a plaister, and prepare a potion?'"

The great physicians of the early eighteenth century were men of learning, culture, and inquiring mind, but among a public completely ignorant of medical knowledge and unfamiliar with medical thought, their success had to depend largely upon grandeur of dress and appointments, impressiveness of manner, and a certain affectation of mystery. These superficial characters were seized upon by men who did not possess the learning, ability, or honesty of the physicians, but who were simply interested to drive medicine as a profitable trade. Accordingly the eighteenth century is especially notorious for the blatant imposition which flourished at that period.

The eighteenth century quacks had got far beyond the mountebank of the seventeenth century who, by dancing on a tight-rope, attracted a crowd to whom he

then sold useless medicines; in the eighteenth century they were men of grandeur and often of imposing personal presence.

One of the earliest of these was William Read, a tailor, who set up in the Strand as an oculist, hired someone to write a book on eye-diseases under his name, procured poets to circulate verses in his praise, and attracted the attention of Queen Anne, whose bad eyesight he was called to treat; later he actually became oculist to George I, and was knighted.

"Spot" Ward was a drysalter who made a fortune by selling antimonial pills and other nostrums. Some of his medicines ultimately found their way into the Pharmacopœia, such as the compound camphor liniment and confection of pepper, and, being patronized by George II, he won the confidence of this monarch by reducing a dislocated thumb. Pope has immortalized him in a couplet:—

> "Of late without the least pretence to skill,
> Ward's grown a famed physician by a pill."

Mrs. Mapp, a bone-setter, drove about London in a carriage-and-four with liveried servants, and had a huge practice, and Joanna Stevens, another pretender who declared she had an infallible remedy against the stone, then a frequent disorder, actually managed to sell the composition of her remedy to Parliament for £5,000 in 1739.

A celebrated quack towards the end of the century was Dr. Katterfelto, who devised a remedy for influenza, which was very prevalent in 1782. He travelled about the country in a fine caravan accompanied by a number of black cats, and later opened a quasi-scientific exhibition at 22 Piccadilly. James Graham, who settled in London about 1780, has been called the "Emperor of Quacks." His "Temple of Health" at Schomberg House in Pall Mall, which was lavishly decorated, became a fashionable resort, and in one of its rooms was the grand "celestial bed" in which people might sleep for a night at a fee of 500 guineas, with a guarantee of conception to the childless. Another room contained the magnetic throne on which patients were seated for electrical treatment. The public fancy later turned away from Graham, creditors began to press for payment, and he ultimately died insane.

An amusing German impostor was Dr. Myersbach, who purchased an M.D. degree from Erfurth and settled in London about 1774. He revived the mediæval custom of diagnosing disease and prescribing treatment from inspection of the patient's urine only, a practice which was still in vogue in some of the country districts of England. He was vigorously opposed by Lettsom, and various traps were set for him. Thus when a flask of port wine, purporting to be urine, was shown to him, he diagnosed disease of the womb and prescribed suitably for its cure. One practical joker presented him with the urine of a cow, and from it Dr. Myersbach diagnosed that the young gentleman had been "too free with the ladies of the town." Such mistakes were eagerly printed in a pamphlet by Lettsom who came to the conclusion that "Dr. Myersbach knew less of urine than a chamber-maid, and as little of medicine as most of his patients." Dr. Myersbach had to retire for a year to his native Germany, but afterwards returned and practised successfully in London.

Another distinctive feature of eighteenth century medicine was the rise of various systems which provided short cuts to treatment, depending upon some special theory of disease. There is inherent in the mind both of the laity and of the practitioner a desire to discover a simple theory of disease and routine system of treatment which will avoid study, thought and trouble. The system may be a twist of the spine or a serum or a vaccine, and the eighteenth century was prolific in these, although they have all now passed into oblivion with one exception. This was the Brunonian theory, originated by John Brown of Edinburgh, and later of London, which attributed all disease to a too great rigidity or too great laxity of the

body. The idea was as old as the days of Asklepiades of Bithynia, and it still survives in the frequent request of flabby people for a tonic, and in the so-called relaxing treatment for people who eat too much and live too hard a life. For stimulation of an asthenic condition, Brown chose brandy and for relaxation of too sthenic a state he selected laudanum. The beautiful simplicity of this system, which dispensed with the necessity for any study of the medical sciences or for any labour in diagnosis, attracted the public all over Europe, but Brown, after a meteoric success, died in poverty, through a too rapid alternation of his own remedies.

To return to regular medicine. With the accession of the Hanoverian dynasty in 1714, the interest of society in literary pursuits was much abated, and medicine in particular became greatly influenced by German ideas. Georg Ernst Stahl of Bavaria, about the beginning of the century, had introduced the idea of a sensitive soul as the *fons et origo* of all bodily activity, and this idea of the dominance of the mind came to influence English medicine to a great extent. Under the auspices of George II, and with the financial help of English gold, the University of Göttingen in Hanover was founded in 1734, and quickly became one of the most important medical schools of Germany. Here Albrecht von Haller was professor for seventeen years, and he modified the vitalistic theory of Stahl to the idea that "irritability" was the specific property of all living or organized tissues. This afforded an explanation of nervous, muscular, and in fact of all bodily activities. His theory was modified by Robert Whytt of Edinburgh, a now almost forgotten neurologist, to one of nerve-force governing all animal activities and replacing the animal spirits of the old medical writers. This idea, expounded by his pupil William Cullen, has remained almost to the present day in medicine. William Cullen was a clear thinker and a great teacher from about 1760 to 1790. He was also responsible for a systematic grouping of diseases. Prior to his day, disorders were arranged according to the part affected, *a capite ad pedes*. Great success had been obtained in gaining a clearer idea of the vegetable world by the system which Linnæus introduced in the *Systema Naturae* (1735) by grouping plants into orders, genera and species, and Cullen in his *Nosologia* (1769) adopted a similar grouping for diseases, which remained an accepted classification till about the end of the century. This has the disadvantage of fixing and stereotyping certain diseases as if they were the only conditions from which the human body could suffer, but, as we shall see, one of the special features of medicine in the latter part of the century was the diligence with which several physicians noted and published accounts of diseases which up till then had been unrecorded.

What is called "scientific medicine" made certain notable advances in the eighteenth century. Stephen Hales made great contributions to plant physiology by his *Vegetable Staticks* in 1727, and in his *Statickal Essays*, 1733, he investigated blood-pressure and other problems of animal physiology.

Sir John Floyer's *Physician's Pulse Watch*, an attempt to revive the ancient lore of the pulse in different diseases, though it was published in 1707, belongs in spirit to the previous century.

In chemistry, Joseph Black conducted his experiments with carbon dioxide in 1754, and showed that this gas, given off both by breathing and combustion, united with magnesia and other alkalies to form earths. His careful experiments with this, the first gas to be isolated, formed the basis of modern chemistry, and overthrew the previous idea that when a material burned, it parted with a hypothetical substance, "phlogiston." Joseph Priestley in 1774 carried out further experiments on respiration of plants and animals, and Henry Cavendish about 1783 discovered the constitution of water and of air, but it remained for a Frenchman, Lavoisier, just before the close of the century, to weigh and name oxygen, and so finally to solve the riddle of the meaning of breathing.

The year 1761 has two rubrics that mark the beginning of a new chapter in

medicine. On the Continent, Morgagni published his *De Sedibus et Causis Morborum* which associated morbid anatomical states with certain diseases, and showed that each disease had an anatomy of its own. In England, John Hunter settled in London in this year. The work of Morgagni and of the Hunters and their followers gave a scientific foundation to medicine and stimulated medical discovery. So much has been written of John Hunter that I need not here enumerate his discoveries and work. It is sufficient to point out that he gave to surgeons rational explanations for the operations they had to perform. He raised them from being mere handicraft men into men who required education and thought for what they did. What John Hunter did for surgery his brother William Hunter did for obstetrics. There were various practitioners like William Smellie, Thomas Denman and William Osborne who published practical treatises on the art of midwifery, but William Hunter's *Anatomy of the Gravid Uterus* (1774) afforded a basis for comprehension of the processes concerned and for future research regarding them.

Matthew Baillie, nephew of the Hunters, in his *Morbid Anatomy of the Human Body* (1795) issued the first atlas of morbid anatomy in which pictures of diseased states were connected, in the modern fashion, with symptoms during life, and not figured as mere curiosities, according to the previous custom of anatomical atlases. At the same time biology had been advanced on the Continent by Linnæus, Buffon, Lamarck and others, and this excited investigation into comparative anatomy among men such as Alexander Monro of Edinburgh, John Hunter, William Hewson and William Cruickshank, with the result that discoveries, important for medical practice, like that of the lymphatic vessels, were being made in the latter half of the century.

Electricity as a therapeutic measure was introduced in the eighteenth century. Benjamin Franklin, of Pennsylvania, then an English colony, was the great pioneer in electrical science, with his experiments carried out at Philadelphia from 1751 to 1754. Henry Cavendish made exact measurements of electrical capacity about 1776, and John Hunter made investigations on electric fishes, but the person who popularized electrical applications as a remedy was John Wesley, the preacher, in his pamphlet, *Electricity made plain and useful by a lover of mankind and common sense.* At the close of the century in Italy, Galvani (1791) and Volta (1799) published their researches, which among other things showed that the so-called animal electricity was no different from this form of energy otherwise produced.

Sea-bathing for the treatment of scrofula was introduced by Dr. Richard Russell, a physician of Lewes, who wrote a book about the subject in 1750. This had an enormous circulation, and since he sent his patients to bathe at Brighton, he incidentally made the reputation of this small town as a health resort. Sea-bathing became a veritable craze among the well-to-do, and the poet Cowper humorously said that to Brighton the people:

> "In coaches, chaises, caravans and hoys
> Fly to the coast for daily, nightly joys,
> And, all impatient of dry land, agree
> With one consent to rush into the sea."

In 1791, on the instigation of Lettsom, a sea-bathing infirmary was started at Margate so that poorer persons might also enjoy the benefits that had been found to accrue from sea-bathing, sunshine and fresh air. The people were taught there to bask in solaria, and this is generally regarded as the beginning of sanatorium treatment for tuberculosis. Cold bathing for typhoid fever was practised by James Currie of Liverpool, generally with sea water, and recommended in his *Medical Reports* (1798).

One of the most remarkable aspects of medicine in the later half of the eighteenth century is the steady accumulation of isolated clinical facts and new descriptions of

diseases. Of these the most outstanding was Withering's *Account of the Foxglove*, 1785. He had heard from an old woman near Birmingham that the foxglove had long been used by the country people for dropsy, and he at once set about trying it. He obtained immediate success though he noted that it was ineffective in certain kinds of dropsy.

William Heberden, called by Dr. Johnson "ultimus Romanorum, the last of the great physicians," gave the first descriptions of chickenpox (1768), angina pectoris, nyctalopia, the fingers of rheumatoid arthritis, &c.

John Fothergill, the greatest of the Quaker physicians, was noted for his philanthropy and for his collections, which went to increase the museum of William Hunter. He is said to have given the first descriptions of diphtheria (1748) and of facial neuralgia (1773).

John Coakley Lettsom, the successor of Fothergill, and also a Quaker, has recently been brought into prominence by Abraham's admirable biography. Although he was active in the foundation of many benevolent enterprises, he is chiefly remembered as the organizer of the Medical Society of London.

Caleb Hillier Parry, of Bath, in 1786 gave the first account of exophthalmic goitre.

John Huxham, in his *Essay on Fevers* (1755), did much to clear up this confused subject, and was the first to call attention to the paralysis following putrid sore throat.

Sir George Baker in 1767 discovered the cause of the endemic colic of Devonshire to be the contamination of cider with lead from pipes and vats.

James Lind effected the disappearance of scurvy, which, ever since the days of long voyages, had been the chief cause of sickness in the navy and mercantile marine. His *Treatise on Scurvy* was published in 1753, though the Admiralty did not carry out his suggestion of a regular ration of lemon-juice until 1794.

Throughout the eighteenth century an increasing humanitarian movement was visible in society, and with this medicine had much to do.

In military medicine Sir John Pringle, who had been professor of moral philosophy at Edinburgh, and who was later physician-general to the forces in Flanders, published in 1752 his *Observations on Diseases of the Army*, which has become a military classic. In 1743, on his suggestion, arrangements were made between the officers commanding the British and French forces that military hospitals on both sides should be regarded as neutral, and should receive mutual protection. This formed the basis for the subsequent Geneva Convention and the Red Cross organization.

The reform of prison management which followed John Howard's *Report on the State Prisons of England and Wales* in 1777, was ably supported by Lettsom and other physicians, and had much to do with suppressing the scourge of typhus fever.

The humane treatment of insane persons engaged the attention of the public and of the medical profession towards the end of the eighteenth century. At the end of the seventeenth century the situation in regard to these unfortunate people had been summed up by Lord Fountainhall in the words: "Having no Bedlam, we put the better sort of mad people to the care and taming of chirurgeons, and the inferior to the scourge." The dramatic commencement of the humane treatment of the insane took place in Paris in 1792 when Philippe Pinel, abetted by some of the most sanguinary of the French revolutionaries, struck off the fetters of fifty-three patients in the Bicêtre Hospital, but the matter had long been engaging the attention of the Quakers in England. In 1796 the Retreat at York was opened by William Tuke as a retired habitation for persons deranged in mind. The first physician to this institution was Dr. Thomas Fowler, the originator of Fowler's solution of arsenic. With the commencement of the nineteenth century, the movement rapidly gained momentum.

The foundation of hospitals was one outward sign of the humanitarian movement, which became more necessary as population gravitated to the towns with the development of the industrial revolution. At the beginning of the eighteenth century there were in London only two large hospitals, St. Bartholomew's and St. Thomas's, but the middle of the century saw the beginnings of Guy's, St. George's, the London, the Middlesex and Queen Charlotte's. In Scotland, the Royal Infirmaries of Edinburgh, Aberdeen, and Glasgow were founded during the course of this century, and most of the large provincial cities throughout England followed suit before its close. The eighteenth century was the era of hospital building as the thirteenth century had been that of cathedrals.

Clinical Section

President—E. G. SLESINGER, O.B.E., M.S.

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Generalized Diseases of the Skeleton

By H. A. T. FAIRBANK, D.S.O., M.S.

WHEN the President invited me to open a discussion on the general affections of the skeleton and to attempt a classification, I suspect he hardly realized the magnitude of the task. Some indication of the difficulties encountered is given by the fact that more than fifty affections have had to be considered and the latest theories as to the causation of each carefully studied. It seemed best to adopt the usual method and classify them according to their ætiology when this is known. Those of unknown origin are placed in two groups, according to whether they are congenital or acquired. Isolated cases in the literature which it is difficult or impossible to place in any one of the groups tabulated have, for the most part, been discarded. No doubt the classification submitted will be considered open to criticism; certainly it will have to be modified in years to come, as a result of further research. Since many of the affections with which we are concerned to-day are met with in the growing child and are associated with various errors in the formation and maintenance of the bony skeleton, it is desirable that something should be said as to the various factors involved in the development of normal bone. Anything approaching a comprehensive summary of all the facts and theories is out of the question.

Briefly, in bones preformed in cartilage, the cells of this cartilage must proliferate normally and, at the growing ends, form regular columns before calcification and ossification can occur in a normal manner. An essential factor is the presence of the enzyme phosphatase, which is synthetized by the cartilage cells and also possibly by the osteoblasts, and is concerned with the precipitation of the lime salts. The blood must carry a sufficiency of calcium and phosphorus in suitable form. For this to occur not only must the diet contain a sufficient quantity of these minerals, and the intestinal wall be capable of absorbing them, but it must also contain an adequate supply of the necessary vitamins, particularly vitamin D, or these must be supplemented by formation within the body. Then there are the endocrines which not only interact one upon the others, but play an essential part both in the growth of the skeleton and in maintaining the strength and solidity of the bone when formed. The pituitary and the parathyroids are outstanding in this respect, but no ductless gland fails to play some part, at least, in the complex mechanism. Lastly we must remember the osteoclasts which remove unwanted bone, and the periosteum with its bone-forming and modelling functions.

Any step in the process and any one or more of these interacting factors may be at fault, and, as a result, produce one of the many abnormal types which are now recognized. Besides the above, however, other possible causes have to be considered. In certain blood and lymphatic diseases the medullary reactions may be sufficiently marked to distort the X-ray shadows cast by the bones. In other cases widespread bone changes are the result of specific infection or certain toxæmias. Some malignant growths tend to metastasize in the bone. In many of the developmental errors, although it may be apparent which step in the growth process has gone astray, we do not know why the fault has occurred. The possibility that the fault in some cases lies in the ovum itself cannot, I think, be ignored. It is rather amazing how very true to type the bones grow, and this normal growth can, to a large extent, occur even in the absence of the normal stresses and strains to which a bone is submitted during growth. Last year, at Cambridge Dr. Fell showed the members of the British Orthopædic Association a chick femur, cultivated *in vivo*, which had not only grown, but had actually developed condyles, in spite of the fact that it was entirely isolated. If this can happen it is surely possible for a femur, of an achondroplasiac, for instance, to mean from the first to develop the shape and form peculiar to this condition ; and there is no necessity to seek for a factor which has disturbed the growth which had every intention of following normal lines. It is a striking fact that the skeleton of achondroplasiacs, with very few exceptions, is singularly true to type.

We cannot leave this point without referring to the theory of Professor Murk Jansen, whose recent death has been a source of grief to his many friends in this country. Jansen [1] suggested amniotic pressure as the cause of many of the recognized developmental errors, the particular type produced depending on the moment in fœtal life at which the pressure became injurious, the parts exhibiting the most active growth at this moment being chiefly affected. Though deeply impressed by the ingenuity with which the author of this theory, with his great knowledge of embryology, made it account for so many different conditions, surgeons in general have not accepted it. The same author was inclined to classify the osseous dystrophies according to the part of the bone showing the chief changes, e.g. epiphysial dysostosis, metaphysial dysostosis, &c. This is useful only up to a point, and with a limited number of affections. It must be remembered that, though the epiphysis of to-day is the epiphysis of to-morrow, the metaphysis of to-day is the diaphysis of to-morrow. Thus an abnormal diaphysis may result either from a comparatively recently acquired disease or may indicate a metaphysial error in the past, even though the latter now shows a strong tendency towards normal growth. In his recent Hunterian Lecture, which by his courtesy I was able to read in manuscript, Brailsford discussed these general affections of the skeleton under eight headings, some of which were single affections while others included a number of diseases.

There are two more points before we pass on to consider the classification I venture to submit. The first is the tendency of so many of the conditions in this list to appear in three different ways. There may be a single lesion (focal), there may be several (multiple focal), or the disease may be more or less generalized. This is true not only of exostoses, cartilage-tumours, and cysts, but also of such conditions as marble bones, osteitis deformans, gigantism, and even of the metaphysial and disc changes seen in those resulting from metabolic errors. In the case of some of these conditions we know nothing as to the causation whether the lesions be single or multiple, while in the case of others, renal rickets for instance, we know that all the bone lesions, whether few or many, are due to the same cause. In fibrocystic disease, however, though the lesions in the focal types, single and multiple, are similar to those found in the generalized form of the disease, it is only of the last that the cause is known. No doubt time will provide answers to many of the questions.

The second point to which I wish to allude is the frequency with which the lower ends of the radius and ulna are strikingly affected in these cases of generalized disturbance of skeletal growth. The ulna is usually more affected than the radius, particularly in the direction of reduction in length. The fibula is very much less frequently picked out.

GENERAL AFFECTIONS OF THE SKELETON

Due to Congenital Developmental Errors

Osteo-genesis imperfecta. Osteo-genesis imperfecta cystica.
Osteopetrosis (marble bones, Albers-Schönberg Disease).
Diaphysial aclasis (multiple exostoses).
Dyschondroplasia (multiple chondromata).
Metaphysial dysplasia (metaphysial dysostosis, Jansen).
Striated bones (Voorhoeve) (osteopathia striata).
Epiphysial dysplasia.
Epiphysial dysplasia punctic ularis (stippled epiphyses).
Chondro-osteo-dysplasia. Type A: Morquio, Brailsford, &c. Type B: General platyspondylosis, Silverskiold, Scott, &c. Type C: Associated with splanchnomegaly (Sheldon, Cockayne).
Acrocephalosyndactyly (Apert).
Achondroplasia.
Pseudo-achondroplasia. 1. Thomson type. 2. Herringham and Drysdale type.
Ateleiosis.
Loraine type of infantilism (? hypopituitarism).
Myositis ossificans idiopathica.
Cranio-cleido-dysostosis.
Arachnodactyly.

Acquired Affections of Unknown Origin.

Fibrocystic disease (multiple focal).
Leontiasis ossium.
Osteitis deformans.
Osteopoikilosis (osteopathia condensans disseminata) ? congenital.

Due to Errors of Metabolism

Scurvy.
Rickets.
Osteomalacia (mollities ossium). Hunger osteopathies.
Renal rickets.
Cœliac rickets.
Osseous dystrophy after icterus neonatorum (Braid).
Schüller's disease (lipoid granulomatosis; xanthomatosis).
Gaucher's disease.

Due to Endocrine Errors

Cretinism. Myxinfantilism.
Gigantism. Acromegaly.
Progeria (?).
Froelich's syndrome.
Simmonds' disease.
Eunuchoid infantilism.
Generalized fibrocystic disease (hyperparathyroidism).

Due to Infection or Toxæmia

Congenital syphilis.
Hypertrophic osteo-arthropathy.

Due to Errors of the Hæmopoietic and Lymphatic Systems

Lymphatic leukæmia.
Lymphadenoma.

Multiple Neoplasms

Chloroma.
Multiple myelomata.
Secondary carcinomata of prostate, breast, hypernephroma, thyroid, suprarenal (Hutchison's syndrome).
Multiple sarcomata.

I now pass to the consideration of the classified list of skeletal affections. The greatest difficulty has been encountered in deciding whether a certain published

case or cases deserved a separate heading. I have no doubt whatever that no two men would arrive at identical lists, nor that any one man would fail to alter his list if he reconsidered the whole subject again after an interval of a few months. In many cases the ætiology is a matter of dispute among those best fitted to express an opinion.

I now venture to call your attention to a few points of interest about a limited number of these affections, those which I think are particularly open to discussion.

Congenital Developmental Errors

Osteogenesis imperfecta.—Some eight years ago [2] I briefly described a type of this disease distinguished by marked honeycombing of the bones, and I published skiagrams of a case, in a female child. I then pointed out that while a certain amount of vacuolation at the ends of the long bones was not uncommon in osteogenesis imperfecta, particularly in some of the older cases, in the case reported the honeycombing was very striking, and was not confined to the metaphyses. It is now possible to show a later series of skiagrams of this case and to report that investigations of the blood have failed to show any sign of calcium imbalance. The child has become considerably more deformed. The X-ray appearances are quite different from those of generalized fibrocystic disease and I have ventured to give the condition the name of " osteogenesis imperfecta cystica."

In the Museum of King's College Hospital is a skeleton displaying a similar cystic condition with many fractures. So far I have failed to find a case of this type in the literature.

Osteopetrosis or *marble bones* is a subject worthy of more discussion than we can give to it here. The outstanding feature is the density of the bone to X-rays: in some the bone is as hard as marble, in others it is more friable and chalky. Fractures when they occur, are sharp and always more or less transverse, but they are not a very marked feature of most of the cases. It may affect one bone or even only a part thereof, a few bones, or it may be generalized. Putti [3] was, I think, the first to describe, in 1926, cases with a very limited distribution, under a title which the French translate into *os éburné*. In the multiple focal type the changes are not uncommonly confined to one limb, though all the bones of the limbs are not affected, nor does the whole of a bone necessarily show the abnormal density. Léri and Joanny in 1922 [4] described this condition under the title of Mélorhéostose, since the distribution and outline of the dense bone suggested to them the drippings of a candle. Cases showing this limited distribution are commonly spoken of as of the Léri type. The special features of this class, apart from the irregular and limited distribution of the dense patches are changes in the cortical outline of the bone and the presence of pain. The affected part of a bone in this type is often, but not invariably, enlarged irregularly, producing an undulating outline. It is not clear whether the pain is caused directly by the changes in the bone or by secondary arthritis. Limitation of movements in the joints of the affected limb appears to be common. Lastly we have the generalized type. Even in this the appearances vary considerably. The bones may be almost uniformly dense but with the metaphyses more dense than the diaphyses and often enlarged or " clubbed," or the reverse may be the case. Dense and less dense bands may alternate in the bones, and rings of varying density be seen in the tarsal and carpal bones. No doubt the disease may remit or be complicated by rickets. Widespread calcinosis affecting the soft tissues—including the kidneys—may be present.

There seems to be, on the one hand, cases with the chief changes in the skeleton and with little evidence of calcinosis in the soft tissues, and, on the other, cases with marked general calcinosis, the bones being relatively little altered.

This may remind us of the cases of osteogenesis imperfecta without blue sclerotics, and of those with blue sclerotics but without fragility of the bones. This is a serious affection with two grave complications, viz., optic atrophy and anæmia. Enlargement of the spleen and liver has been found in some. Wakeley's [5] case in which only the legs were affected, and these only partially, seems to be a link between the second and third groups described above. A recent experience is of some interest. A child suffering from acute arthritis of the hip was discovered to have generalized osteopetrosis of a somewhat mild type. Her mother, on radiographic examination, showed the very slightest trace of the disease. This is best seen in the hands, where a faint dark band is seen near the base of the phalanges and in the necks of the metacarpals. Somewhat similar bands have been described as a result of poisoning by lead, phosphorus and even bismuth [6].

With regard to *diaphysial aclasis and dyschondroplasia* there is an entirely unjustifiable tendency to confuse them, or to regard them as two manifestations of the same fundamental error. In the first the errant cartilage, which duly becomes ossified, is situated on the surface of the bone, while in the latter it forms masses within the metaphysis. The first rarely affects the hands and feet, the latter almost invariably does so. The first is commonly hereditary, the latter is not. Only in very rare cases can there be any doubt as to which of the two conditions is present. The latter affection has been admirably and comprehensively dealt with in a recent paper by Hunter and Wiles [7].

On turning to the groups which follow in the table, it must be admitted that there is often difficulty in deciding whether the changes are confined to the metaphysis or epiphysis, or sufficiently marked in the one or the other to justify classification into metaphysial and epiphysial groups. Some years ago Professor Jansen presented to the Royal College of Surgeons a series of radiograms of a very remarkable case which last year, I think for the first time, he published [8] under the title of "metaphysial dysostosis." Copies of these radiograms which, by the courtesy of Sir Arthur Keith, I am able to show you, make it clear, I think, that the use of metaphysial in the title is amply justified. I prefer the word dysplasia to dysostosis.

The epiphysial errors may, I think, be divided into two groups. In the first I place the cases which are often published under the title of multiple osteochondritis. Some, and possibly all of these cases are, I think, developmental errors and are not strictly comparable to osteochrondritis as we see it affecting the hip, for instance. On the other hand epiphysial changes are marked in many of the cases placed in the chondro-osteo-dysplasia group, but the whole skeletal picture of these distinguishes them from those now being considered.

An example of this group was a case which at the age of 14 appeared to have bilateral pseudo-coxalgia. Later, similar changes were discovered at the upper end of the humerus. Seen recently at the age of 27, the patient is markedly below the average in height, has short broad square-ended fingers and toes, and shows deformation of the shoulders and hips such as one might expect. His mother has similar hands. I think the present condition in this case is the result of an inherited affection of the skeleton and I am inclined to think that some of the published cases should be placed with this in a separate group.

Some years ago I published [9] radiograms of two cases with "stippled epiphyses" and similar cases have been published since by Buxton [10] and Lightwood [11]. This condition appears to deserve a title, and I suggest "epiphysial dysplasia punctcularis." For the last word I am indebted to Dr. Still, to whose classical knowledge I turned for assistance. It is interesting to note that in Lightwood's case the patient died and the bones were examined by Professor Harris—who, in his book on "Bone-growth" [12] describes mucoid degeneration as present in the epiphyses,

and he says that the fundamental changes are similar to those found in achondroplasia, in cases of which he also found mucoid degeneration of the cartilage. Microscopic sections published by Jansen [13] of a case with gross irregularity of all the epiphyses appear to me to show a similar change. At present it would be unwise to go further than noting these interesting findings. Cartilage which fails to follow the normal course of development might be expected to degenerate, whatever the primary cause or causes of the failure. One of the two cases published by me is dead, the other was lost sight of, so the later appearances of cases of this type are still unknown. Bilateral congenital cateract was present in two of the cases.

A condition of *striated bones* was described by Voorhoeve [14] who regarded it as a form of dyschondroplasia. I doubt whether this is justified, and I am inclined to give it a separate heading. Almost any developmental error of the bones might be regarded as a dyschondroplasia. Without pretending to have searched the literature completely, I have come across no similar case except the one published by myself [15]. Perhaps "osteopathia striata" would be a suitable title. Striation of a few bones may be present in cases of osteitis deformans. Now we come to that most complicated group for which I have no better title to suggest than that rather unsatisfactory one *chondro-osteo-dysplasia*. With Parkes Weber [16] I prefer the word "dysplasia" to "dystrophy" for all these developmental errors. Differences, often slight, in the various cases reported have made it difficult to decide whether to place all in one class or whether to divide them up, and if so, into how many groups. With the greatest diffidence I suggest they be placed provisionally into these groups.

Type A is often called the Morquio [17] type, but Brailsford [18] also published a case about the same time. In cases of this type the patients are dwarfed, backward, particularly in walking, but often quite intelligent. The features may or may not be heavy. The gait is slow, and the attitude, with kyphosis and flexion of hips and knees, rather characteristic. The bones generally are thick and stumpy; the ulna is shorter than the radius. The vertebral bodies are biconvex, the discs being wide and biconcave. The bodies are often wide, especially in the antero-posterior direction, with a tongue-like prolongation in front, but may be rather rounded and notched above and in front. At the site of the kyphotic angle one body—it may be the 12th dorsal or the 1st or 2nd lumbar—is smaller than the others, and, as it were, squeezed backwards out of line. The acetabulæ are wide and the femoral epiphyses irregular.

In the next group, Type B, the broadening and flattening of the vertebral bodies are marked, but there is no angular kyphosis and no displacement of one vertebra. The bones generally, and notably the forearm bones, are similar to those in Type A; epiphysial changes are marked, the epiphyses being mottled or fragmented; coxa vara is common. The finger and other joints may be flexed. Intelligence varies. Dwarfing is not marked, as a rule.

In Type C we find a similar general picture but the liver and spleen are definitely enlarged; there is mental deficiency and often hazy cornea. The kyphosis present may or may not show the displacement backwards of one body as in Type A.

Only a word or two is necessary about one or two of the rest of these developmental errors.

In *achondroplasia* Harris [19] regards the femur, for instance, "as consisting of a series of lines of arrested growth in the whole of its extent, as though presenting a serial summation of the lines of arrested growth," and considers mucoid degeneration of the cartilage as the underlying feature. Personally, I regard this condition as a pure developmental error inherent in the ovum. Almost without exception the cases are singularly true to type.

Of the pseudo-achondroplasic type, showing similar disproportion in the length of the limbs and trunk, Thomson's [20] shows flexed fingers which deviate towards,

instead of away from, the midline of the hand. Ossification is slightly advanced. The auricles are convoluted. Herringham and Drysdale [21] described cases which were apparently normal at birth, but later acquired the shortness of the limbs, with stunted fingers parallel to each other. The published radiogram of the hand is not unlike that seen in chondro-osteo dysplasia. The hereditary factor is well marked. The head is normal.

As to *cranio-cleido-dysostosis*, I would again call attention to absence of ossification in the pubis in childhood. In a small collection of eight cases, all the children, seven in number, show this peculiarity, one being a boy with unilateral dysostosis of the clavicle with unilateral coxa vara of the infantile type on the same side. Both pubes were unossified in this case. His mother had both clavicles affected and a pelvis normally ossified. His sister is a bilateral case and is included in the seven children showing delayed ossification of the pubis. Two of the eight cases showed bilateral and two unilateral coxa vara; of the latter, in one both clavicles were deficient and in the other only one. A radiogram of the pelvis would seem to be occasionally of diagnostic value. Laming Evans [22] reported absence of the tibia associated with absence of ossification in both pubes, but this is the only case of deficient pubes I have met with apart from clavicular dysostosis.

Arachnodactyly is regarded as a very rare condition, but H. Churchill, recently a medical officer at Treloar Hospital, Alton, was able to collect five cases in the Hampshire Clinics. Besides the long, slender shape of the bones, particularly of the hands and feet, the chief features appear to be general weakness and laxity of the ligaments, in some cases allowing dislocation to occur. In two of Churchill's five cases the patients were so weak that they were unable to stand. Four showed eye changes, dislocation of the lens, strabismus, or tremulous irides. Radiographic examination of the head in four of the cases showed a normal pituitary fossa. The condition may be inherited and familial.

Acquired Affections of Unknown Origin

The multiple focal type of fibrocystic disease is placed in this group since at present the cause is unknown.

The distribution may be uni- or bi-lateral. Two cases affecting almost exclusively one side of the body have been reported by me [23]. In one of these the skull was affected, on the same side, by leontiasis. Knaggs [24] describes two types of *leontiasis ossium*, creeping periostitis and diffuse osteitis, the latter being allied to osteitis fibrosa.

In *osteitis deformans* I would call attention to the diagnostic value of the pointed shape of the advancing changes in the bone, e.g. in the tibia, a point which was called attention to originally, I believe, by the late Professor Shattock. It is rather remarkable how very rarely the maxilla and mandible are affected. Treatment by ultra-violet rays, as suggested by Nichory [25], seems to be of real value, at any rate as regards the relief of pain. The incidence of a final sarcomatous change in what is really an extremely common affection seems to me to have been much exaggerated by some authors. I wonder how many of us have even seen it. Fractures, which are not rare in the osteitic femur and tibia, seem to unite well, if slowly, in spite of malposition in the former. In the tibia, displacement, as a rule, is not seen.

Little is known of *osteopoikilosis*, which seems to be associated with no signs or symptoms. Only 19 cases had been reported in 1933 (Jeter and McGehee [26]). General West [27] showed a case and the skiagrams of another before this Society last year. I am permitted to show you slides of one of these, which demonstrates well the wide distribution of the small oval dense spots in the bones which characterize this curious affection.

ERRORS OF METABOLISM

Osteomalacia has been moved into this group from that due to endocrine troubles. It is now regarded by Shipley [28] and others as no more than rickets occurring after the cessation of growth, and curable by the same means. Osteomalacia sclerotica (Boomerang bones), in which softening and deformity are followed by sclerosis, appears to be more common in the native races in various parts of the globe than in Europeans. Parsons [29] describes three types of *renal rickets*, the "atrophic," "florid" and "woolly" respectively, and says that light is useless and may make matters worse, quite apart from the risk of uræmia. I have seen and published [30] a case where the bony changes cleared up under light treatment, but later relapsed, only to respond again to a further course of treatment. However, I understand there is a definite risk attached to this line of treatment. With regard to the severe deformities towards the ends of the long bones, only seen in my experience in the severe and advanced cases, these may be due either to a juxta-epiphysial fracture (partial or complete) or to a true slipping of the epiphysis. The exact nature of the changes in the bones, and the cause thereof, are matters of dispute, and this question cannot be discussed now. Deficient excretion by the kidneys and the resulting retention of certain products is the explanation suggested (Gardiner Hill [31]).

Cœliac rickets, on the other hand, appears to be a true rickets resulting from deficiency of vitamin D, calcium and phosphorus, associated with diminished absorption of fats characteristic of the disease, and to respond to light and other treatment suitable for infantile rickets.

I have to thank Miss Braid [32] for being able to show a set of radiograms of her remarkable case of osseous dystrophy following icterus neonatorum.

The essential pathology of Schüller's and Gaucher's diseases seems to depend on a reticulo-endothelial response to the presence in excess of certain lipoids. These appear to be the only two of this group of diseases that show definite changes in the bones. In the former the skull is particularly affected; epidural granulomatous nodules occur and cause absorption of the overlying bone, with a resulting characteristic radiographic picture. Exophthalmos and diabetes insipidus complete the clinical picture. Gaucher's disease, on the other hand, is a familial affection, and associated with marked enlargement of the spleen. The extent to which the bones are affected in this disease varies. An excellent and exhaustive paper on "Skeletal Lipoid Granulomatosis" has just been published by Fraser [33]. (I am indebted to Professor Woodburn Morison, and Mr. Buxton for slides of these two conditions. Professor Morison has also kindly given me slides of the skull from cases of fibrocystic disease and of myelomatosis, which I show you with one of osteitis deformans for comparison.) It is interesting to note that Theiler [34], regards rickets and osteomalacia in animals as the same disease at different ages, while he also includes osteo-dystrophia fibrosa (fibrocystic disease) in the affections due to dietary errors. He points out the striking differences to be seen in the response of various species of animals to similar dietary deficiencies, and in the incidence of these three affections in different species. Horses seem to be particularly prone to fibrocystic disease, which in them is definitely a dietary disease. At present there is no evidence of parathyroid disturbance in them. Colonel Hamerton tells me that experience at the Zoological Gardens confirms Theiler's views. It will be best for me not to attempt to discuss the remaining groups. It is highly probable that that due to endocrine errors and perhaps others, will be dealt with by the next speaker. I should like, however, to call attention to the skiagrams of a case of hypertrophic osteo-arthropathy following a sarcoma of the tibia. It will be noted that the subperiosteal new bone is laid down intermittently—as if fairly regular waves of increased toxæmia had occurred—with the formation of a number of regular lines parallel to the surface of the cortex. As to the secondary malignant tumours of bone,

it is worth calling attention to the useful classification of Hellner. He divides them into the following four groups, according to the radiographic appearances :—

(1) Osteolytic (breast or hypernephroma).
(2) Cyst-like decalcification (hypernephroma or thyroid).
(3) Piebald or pagetoid (breast or prostate).
(4) Pure osteoplastic (almost invariably prostate).

Finally, I wish to express my indebtedness to an enormous number of people, colleagues and others, who have generously allowed me to add skiagrams and other details of their cases to my collection, to many radiologists, and to innumerable authors whose papers I have read with profit. The list of references appended includes only those directly referred to in the text.

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Studies in Calcium and Phosphorus Metabolism in Generalized Diseases of Bones

By DONALD HUNTER, M.D.

In the study of calcium metabolism it is necessary to know not only the levels of calcium and phosphorus in the blood, but also the calcium and phosphorus balance; for just as the level of a river does not indicate the direction in which it flows, so the levels of the figures in the blood give us in themselves no indication as to whether calcium is flowing into excretory channels or into the tissues. In what follows I refer repeatedly to my own observations, mainly because I have used a systematic method for investigating calcium metabolism which allows of comparisons between different patients and diseases.

In our studies of endogenous calcium metabolism we have given a diet containing only 100 mgm. of calcium a day, but adequate in all other respects. This is necessary in order to reduce to a minimum the amount of unabsorbed calcium in the fæces. Fluid and sodium chloride intake has been kept constant, and distilled water has been used in the preparation of all food and drinks. Sufficient alkali has been given by the mouth to make the reaction of the 24-hour mixed urine neutral to phenol-sulphone-phthalein (pH 7·3). The fæces have been divided into three-day periods by the oral administration of 0·3 grm. of carmine alum lake every third day. The urine has been obtained in 24-hour specimens. Since inorganic salt excretion reaches a constant level only very slowly, we have endeavoured to change our conditions of study not more than once in twelve days.

Hyperparathyroidism

A decade ago we had no proof of the relationship between parathyroid activity and the metabolism of phosphorus and calcium. The discovery of the parathyroid hormone placed in our hands the explanation of generalized osteitis fibrosa of von Recklinghausen; the widespread pathological resorption affecting all the bones is the effect of hyperfunction of a parathyroid tumour.

In hyperparathyroidism in man the following features may be present: Pain and tenderness of bones, sometimes with spontaneous fracture; hypotonia and muscular weakness; anorexia, sometimes with nausea, vomiting, and abdominal cramps; polydipsia and polyuria; renal calculi, sometimes with colic and hæmaturia; wasting in advanced cases; high serum calcium; low plasma phosphorus; high plasma phosphatase; increased output of calcium in the urine; and evidence in radiograms of generalized decalcification of the skeleton, with or without deformities, cysts, and tumours. It is more than twice as common in women as in men, and it usually appears between the ages of 35 and 55. The youngest case known is in a girl of 13, and the oldest in a woman of 69. The serum calcium figures vary between 12·6 and 23·6 mgm. per 100 c.c., the plasma phosphorus between 1·0 and 2·7 mgm.; the output of calcium in the urine varies from a slight increase to eight times the normal figure. Radiograms show a greatly diminished density of bone compared with a control subject, and some authors consider that the picture of decalcification is pathognomonic of the disease, consisting as it does of a uniform, miliary, granular mottling, best observed in the calvaria, thinning of the corticalis and trabeculæ, and the presence of areas of subperiosteal resorption in the long bones and phalanges. In addition there may be radiological evidence of cysts, but these only rarely expand the corticalis. As for the tumour itself, it has been palpable in less than 20% of the sixty cases operated upon. Even the largest removed, which measured 7·5 by 5·0 by 1·8 cm., and weighed 26·2 grm., could not be felt in the neck because it was behind the trachea. In at least 10% of cases the tumour has been removed from the mediastinum, and in eight cases two parathyroid tumours were removed, five of the patients surviving this drastic treatment, while the other three died in tetany. In three cases subtotal parathyroidectomy was performed, for the good reason that in each of them two normal parathyroid bodies had already been excised. In only two of the sixty recorded cases has death immediately followed the operation, but in another six tetany or a renal complication killed the patient at periods varying from nineteen days to fourteen months later. Even if we allow that unsuccessful ventures do not always find their way into print, the operative mortality is not high.

Removal of a parathyroid tumour brings about dramatic changes. Usually, for some reason not yet clear, pain in the bones goes away immediately; in many cases polydipsia and polyuria are promptly abolished; often there is disappearance of

gastro-intestinal symptoms, gain in weight and strength, and ability to resume work. Decrease in size of osteoclastic tumours of bone within a few weeks of operation on the neck has now been many times recorded. As a rule the level of the serum calcium and plasma phosphorus and the excretion of calcium in the urine are restored to normal. Sometimes, indeed, there is temporary hypocalcæmia, and even oliguria. Latent tetany after operation has been very common and manifest tetany has often occurred, followed by death in four cases. Intravenous administration of calcium chloride must be regarded as the essential treatment of this condition. The ordinary post-operative treatment should include a high calcium diet, and ultraviolet irradiation.

We have investigated the blood-chemistry and calcium balance in twelve cases of hyperparathyroidism. The calcium balance is represented in fig. 1 where the

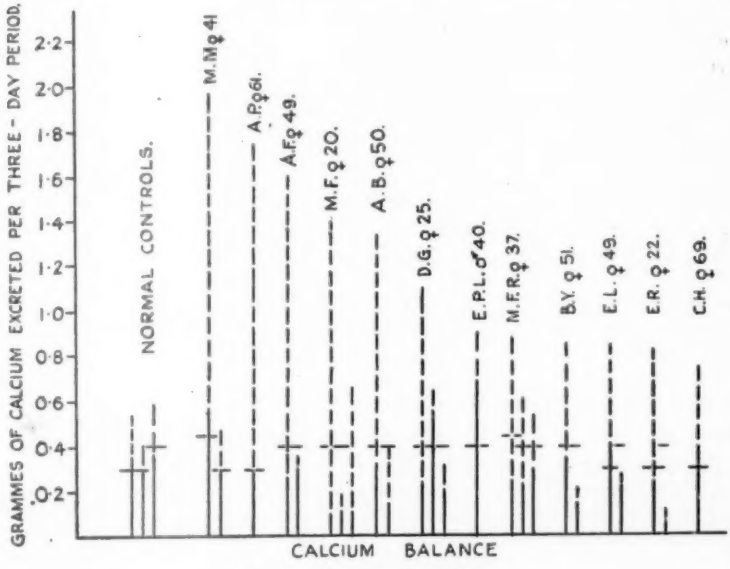


FIG. 1.—Hyperparathyroidism.

The calcium excretion was estimated on a known low calcium intake. The horizontal lines represent the calcium intake which was approximately 100 mgm. daily. The urinary calcium excretion is represented by a dotted line and the fæcal calcium excretion by a continuous line.

cases have been arranged by placing first the ones with the highest calcium output followed by the others in diminishing order. This scheme has been used for all the charts in this communication. With the exception of the seventh case on the chart all had a high serum calcium and a low plasma phosphorus. This was the case of a man aged 40 with metastatic calcification of the kidneys and gross renal insufficiency. The serum calcium was 10·6 mgm. per 100 c.c., and the plasma phosphorus 4·4 mgm. per 100 c.c. It will be seen from the chart that the increased calcium excretion was diverted by way of the alimentary canal, the kidney being incapable of dealing with it. The patient died of uræmia four weeks after removal of a parathyroid tumour. The second case on the chart was that of a woman aged 61. Extensive exploration of the neck in the sites of the four parathyroid bodies

and also of the mediastinum revealed no parathyroid tumour. There is no doubt however, that such a tumour exists and was not found at operation, for the patient has all the characteristic symptoms and signs of the disease and remains ill. The twelfth case was transferred to another hospital where she died immediately after removal of a parathyroid tumour. The remaining nine cases all operated upon by Mr. A. J. Walton made a remarkable recovery, and in all cases except two the blood-chemistry and calcium balance were restored to normal. The fourth case charted is that of a woman aged 20 in whom remarkable recalcification of the whole skeleton occurred after removal of a parathyroid tumour. Before operation she was unable to walk or even to sit up. On examination two and a half years after operation she was active and well, but the serum calcium was 13·5 mgm. per 100 c.c., and the plasma phosphorus 2·7 mgm. per 100 c.c. The calcium output had increased considerably since the figure obtained seven weeks after operation though it was not above the figure obtained in a normal control. Is hyperfunction commencing in the remaining parathyroid glands?

Hyperparathyroidism is a conception less than ten years old, and there can be few maladies, old or new, whose mystery has been solved so speedily. But this, of course, is less than half a truth, for if the skeletal changes are due to over-secretion from a parathyroid tumour, what then is the cause of the tumour? And if we cannot answer this question, how can we foretell the fate of the patients "cured" or say what will happen to the remaining parathyroid glands? In the above series at least two cases show what seems to be hyperfunction on the part of the remaining parathyroid glands. Long-continued and careful studies are needed before these matters become clear, but in the meantime very much has been achieved. It is noteworthy that at least sixty people should be relieved of so much suffering which seemed beyond all remedy, and it is promising that cases are now being cured before bony deformities appear. The terrible crippling caused by generalized osteitis fibrosa will soon be a thing of the past.

Case I.—Hyperparathyroidism, Generalized Osteitis Fibrosa.

Previously shown November 1929, *Proceedings*, xxiii, 227 (Sect. Med., 27).

M. M., married woman, aged 46. (L. H. Reg. No. 40173/1929.)

Clinical history.—1926: Pain in right knee, lower part of back, left buttock, left hip, and back of left thigh. August 1927: Was told she had rheumatoid arthritis. Radiant heat treatment caused more pain. May 1928: Unable to walk without sticks. Came to the London Hospital, where Dr. R. A. Rowlands established a diagnosis of generalized osteitis fibrosa by radiograms of bones. September 1929: Constant pain in lower part of spine, and tenderness of forearms and shins on pressure; shaking hands became painful owing to tenderness in the bones on compression of the knuckles. November 10, 1929: She twisted her left ankle, causing a spontaneous fracture of the neck of the left femur. There was great pain on attempting to manipulate the left hip. Pressure upon the shafts of the long bones, especially of the radius, ulna, and tibia, caused pain. In addition, there was a smooth, firm, slightly tender swelling, 4 × 1·5 cm. in the lower end of the right ulna corresponding to the trabeculated cyst-like area previously seen in radiograms (Plate II, fig. 2). Weight, 6 st. 13 lb. November 1929: Operation, excision of parathyroid tumour (Mr. A. J. Walton).

Progress.—On the second day pressure upon the bones caused much less pain than previously. On the fourth day and subsequently pressure upon bones caused no pain. In the first week tinglings of the fingers occurred, but there was no manifest tetany. The blood chemistry and increased calcium output in the urine were restored to normal (fig. 1). The bone shadows in controlled radiograms

became gradually more dense (Plate III, fig. 3). The fracture of the left femur healed, and she has since walked without disability. Weight 8 st. 4 lb.

Case II.—Hyperparathyroidism, Generalized Osteitis Fibrosa with Multiple Osteoclastomata.

Previously shown December 1930, *Proceedings*, xxiv, 480 (Clin. Sect., 40).

M. F. R., single woman, aged 41.

Clinical history.—1925: Onset with pain in bones. May 1930: Completely crippled and bed-ridden for three years by multiple bone deformities. Great pain and tenderness in bones. Weight 4 st. 13 lb.

July 1930.—Operation: Excision of parathyroid tumour (Mr. A. J. Walton).

Progress.—There was temporary post-operative tetany which disappeared under treatment after seventeen days. All pain and tenderness disappeared from the bones. Five weeks after operation a bony tumour on the dorsum of the right hand had almost disappeared. The blood chemistry and increased calcium output in the urine were restored to normal (fig. 1). The bone shadows in radiograms as compared to controls (Plate IV, fig. 4) became gradually more dense and after one year approached the normal (Plate V, fig. 5). Cyst-like areas expanding bone became smaller, and the third right metacarpal changed from a large osteoclastoma almost to a normal bone. In spite of destruction of the heads of the femora, the patient is able to get about with sticks, and great improvement in the hands allows her to do household duties, to sew, and to knit. Weight 6 st. 2 lb.

Focal Osteitis Fibrosa

Of much more common occurrence than the generalized disease is focal osteitis fibrosa. This is a condition affecting one or more bones, usually not disabling, of

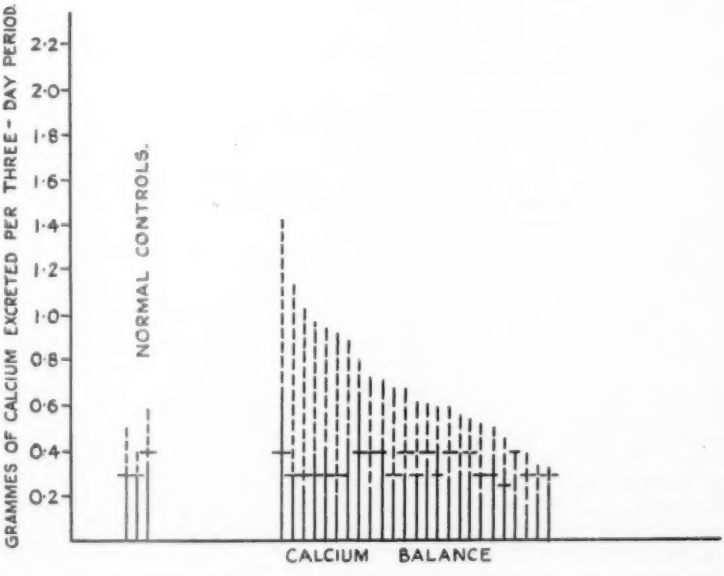


FIG. 6.—Focal osteitis fibrosa.

slow progress, and showing a tendency to become arrested. It occurs chiefly in adolescence, and is often symptomless until spontaneous fracture occurs. The serum calcium and plasma phosphorus are invariably normal, a finding in striking contrast to that of the generalized disease. We have investigated the calcium balance in 25 cases of focal osteitis fibrosa, and in more than 70% of these it was normal (fig. 6). Taken in conjunction with a normal blood chemistry, this finding is of far-reaching importance. Supported as it is by the normal density of the radiographic shadows of bones, it is evidence strongly against hyperparathyroidism. It is important in such cases to realize that even though many bones may be affected the condition is totally different from the generalized disease and that exploration of the neck is unjustifiable.

Thyrotoxic Osteoporosis

It is, of course, known that thyroxine raises the basal rate of combustion of carbohydrate, fat, and possibly protein, consequently appreciably increasing the total heat production of the organism. Its effect, however, on inorganic salt metabolism has been worked out only recently. In cases of exophthalmic goitre the serum calcium and plasma phosphorus figures are invariably normal, but the calcium excretion may be raised even as high as eight times the normal. In some of these cases extensive decalcification of bone occurs by the mechanism of osteoclastic lacunar resorption. In our experience controlled radiograms of the bones in exophthalmic goitre reveal poverty of calcium in less than half the cases examined. In cases of hyperthyroidism with spontaneous fracture there may be radiographic evidence of decalcification not only in the fractured bone but also in all other bones examined. During treatment with iodine and after subtotal thyroidectomy, as the patient improves and the basal metabolic rate approaches the normal, the calcium excretion also returns towards normal. The density of the radiographic shadows of the bones may then improve.

Case III.—Thyrotoxic Osteoporosis.

A. D., single woman, aged 37. (L. H. Reg. No. 40126/1934.)

Clinical history.—Since age of 14 noticed lump in neck which gradually increased in size. Eight years ago: became nervous and thin, and noticed bending of back. Two years ago: lump in neck became uncomfortable, and perhaps larger. Patient became increasingly nervous and worried, and lost more weight. Tremor, palpitation, and shortness of breath occurred.

Past history.—Born in Kent, and has continued to live there except for four years in Yorkshire. Has two sisters with goitre.

Clinical examination.—When first seen (January 19, 1934), thin, ill, worried, woman. Weight 7 st. 7 lb. No exophthalmos. Considerable nodular enlargement of thyroid, with two cystic swellings, the larger (5 by 4 cm.) involving the left lobe and isthmus. Lower dorsal kyphosis, and lumbar lordosis. No angular curvature, and no tenderness on percussion. Deep transverse crease in abdominal wall. Subcostal margins within 5 cm. of iliac crests. All other bones normal. Pulse regular, 150. Marked vascular pulsation in neck. Apex beat 5th space in mid-clavicular line, no murmurs nor thrills. Blood-pressure 150/80. Radiograms of bones showed extensive osteoporosis (Plate I, fig. 7). Lumbar and thoracic spine shortened with partial collapse of many vertebræ, and slight dorsal scoliosis. Osteoporosis of bones of pelvis, with asymmetry in iliac bones. Controlled radiograms of long bones showed some generalized decalcification without deformity or cyst formation. No renal calculi. Urine: Acid, heavy cloud of albumin, no sugar; deposit, many red

cells and occasional leucocytes. Blood-urea 21 mgm. per 100 c.c. Renal efficiency tests normal.

Blood chemistry :—

Date	Serum calcium mgm. per 100 c.c.	Plasma phosphorus mgm. per 100 c.c.	Plasma phosphatase mgm.
19.2.34	10·3	2·4	0·374
27.2.34	9·7	3·9	0·348
2.3.34	10·9	3·8	
6.3.34	10·9	4·1	
9.3.34	10·5	4·5	
16.3.34	10·8	4·2	
23.3.34	10·0	4·4	
28.3.34	10·0	4·3	

Calcium balance before operation (grm. per 3 days) :—

Date	Intake	Calcium in urine	Calcium in fæces	Total calcium
27.2.34 to 2.3.34	0·396	0·22	1·05	1·27
2.3.34 to 5.3.34	0·396	0·35	0·42	0·87
Mean	0·396	0·29	0·73	1·07

Progress.—Two attacks of paroxysmal auricular fibrillation occurred, with acute respiratory distress and œdema of ankles and feet.

April 27, 1934.—Operation : Hemithyroidectomy (Mr. Alan Perry). The excised portion of the thyroid contained many isolated tense adenomata which felt cystic. On cutting into them there was a small amount of fluid in two. One of these was pressing on the trachea, and the other went down behind it to the superior aperture of the thorax. On section the thyroid was granular and red-brown. Histological appearances (S.D. 990/1934) : Nodular goitre. Recovery after the operation was uninterrupted. The pulse-rate dropped to 80. Controlled radiograms of bones taken twelve months after operation showed no improvement in the extensive osteoporosis.

Calcium balance after operation (grm. per 3 days) :—

Date	Intake	Calcium in urine	Calcium in fæces	Total calcium
10.5.34 to 13.5.34	0·306	0·62	0·55	1·17
13.5.34 to 16.5.34	0·306	0·46	0·52	0·98
Mean	0·306	0·54	0·54	1·08

The total calcium output after operation is thus approximately the same as before, but the fæcal excretion is less (fig. 8).

Osteitis Deformans (*Paget*)

Osteitis deformans begins usually at the age of 55 or later. It may remain symptomless for ten years or more. Its progress is always very slow, and its effect on the general health is slight. Pain, of widely varying severity, occurs in the affected bones, but the limbs, however misshapen, remain strong and fit to support the trunk. It seems doubtful whether there is any greater tendency for the affected bones to break than there is in normal individuals. The incidence of osteogenic sarcoma has been exaggerated, and even where it has been proved to occur, the patient has usually had osteitis deformans for fifteen years. In advanced cases with considerable bowing of the femora, osteo-arthritis of the knees may occur. The superficial arteries are usually thickened and tortuous, and radiograms reveal the shadows of arterial calcification in more than 40% of cases. Osteitis deformans is not inflammatory in origin. It seems likely that it is a disorder of mineral metabolism. The histological appearances are definitely different from those of osteitis fibrosa, and enlargement of the parathyroid glands has not been demonstrated. The serum calcium and plasma phosphorus are normal. The plasma phosphatase

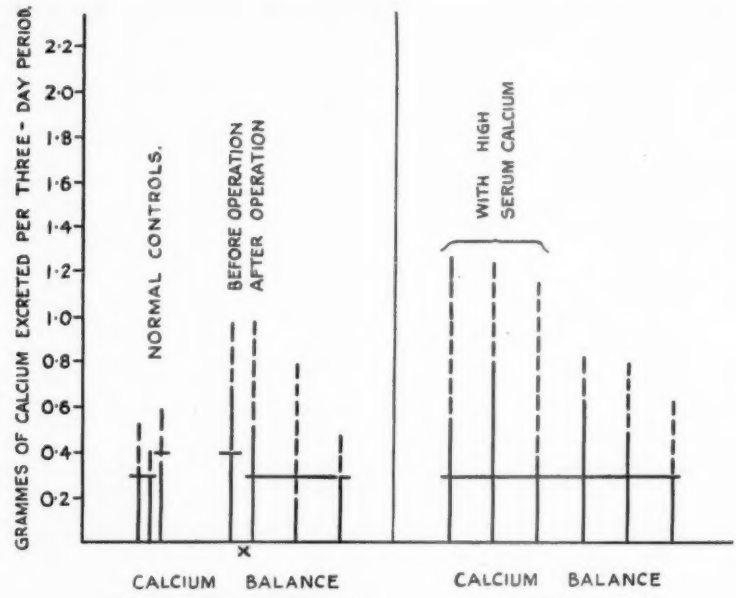


FIG. 8.—Thyrotoxic osteoporosis.

FIG. 10.—Myelomatosis.

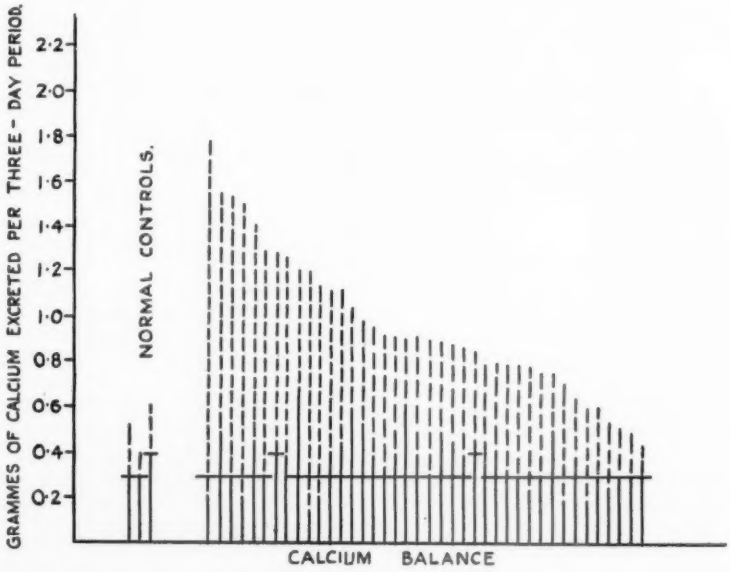


FIG. 9.—Osteitis deformans. (Paget.)

is constantly high, as in many other generalized diseases of bone. We have investigated the calcium balance in 40 cases of osteitis deformans (fig. 9). In more than 80% of these cases the calcium output in the urine is greater than normal, and may reach four or five times the normal figure. In this series of cases there seems to be a complete absence of correlation between the length of history, the density of the bone shadows in radiograms, and the calcium output. A case showing increased density of bone trabeculæ throughout pelvis, lumbar spine, and femora is just as likely to show a high output of calcium in the urine as a low output. No known treatment alters the course of osteitis deformans in the slightest degree. Since the bones at one stage are sufficiently decalcified to bend, it is rational to use methods which aim at increasing the calcium intake, such as a high calcium diet and calciferol. The claim that prolonged exposure to general ultra-violet irradiation has resulted in increased density of the shadows of bones in radiograms has not been confirmed in our experience. Exploration of the neck for a parathyroid tumour is never justified. Osteotomy is rarely necessary, but it is interesting that where a portion of bone has been removed for histological section relief of pain has sometimes occurred.

Multiple Myelomatosis

For obvious reasons the multiple marrow tumours in this disease may lead to its confusion with a generalized disease of bone. The Bence Jones protein is nearly always found in the urine. Metastatic calcification, while by no means constant, has been frequently observed, the kidneys, lungs, stomach, myocardium, and uterine mucosa being picked out. Taking into account the bone destruction which occurs as a result of erosion by the marrow tumours, and also the metastatic calcification, it is not surprising that high serum calcium values have sometimes been found in this disease. Figures from 13·4 to 16·1 mgm. per 100 c.c. have been recorded. We have investigated the calcium balance in six cases (fig. 10). Roughly speaking, those with a normal serum calcium had a normal calcium output, and those with a high serum calcium showed double the normal calcium output. Where multiple myelomatosis coincides with renal insufficiency, the plasma phosphorus is found to be high, and may rise as the kidney condition becomes worse. This is an important point in differential diagnosis, the high serum calcium being associated with a high plasma phosphorus, whereas the characteristic effect produced by parathyroid hyperfunction is a high serum calcium with a low plasma phosphorus. It has never been shown that the parathyroids are enlarged in multiple myelomatosis: in three of our cases examined at autopsy they were found to be normal. It is clearly unjustifiable to explore the neck in search of a parathyroid tumour in this disease.

Carcinomatosis of Bones

Secondary carcinomatous deposits in bones may stimulate either osteoclastic resorption or osteoblastic apposition, or both. Usually resorption preponderates and a condition of gross osteoporosis with a tendency to fracture results: it is known as osteoclastic carcinomatosis. Rarely osteoblastic apposition preponderates, and then the skeleton may become so dense as to resemble marble. This is known as osteoplastic carcinomatosis. The two conditions can be readily distinguished in radiograms. Mixed forms are known to occur.

We have studied the calcium balance in ten cases of carcinomatosis of bones (fig. 11). Where the changes are mainly osteoclastic the calcium output may be two or three times the normal. In osteoplastic carcinomatosis the calcium balance is actually positive; that is to say, the patient excretes less calcium than is present in the diet. Under these conditions the serum calcium figure may be 8·5 or 9 mgm. per 100 c.c. In all other circumstances the serum calcium and plasma phosphorus

figures are normal in carcinomatosis of bones. The plasma phosphatase is always raised.

Leuco-erythroblastic Anæmia with Osteosclerosis

This condition is of unknown ætiology. The following synonyms have been used to describe it : Myelosclerosis, osteosclerotic anæmia, aleukæmic myeloid leukæmia with osteosclerosis. It is characterized by leuco-erythroblastic anæmia, splenomegaly, irregular increase in the density of the bones, as seen in radiograms, and increase in fibrous or bony tissue in the marrow cavities. Leuco-erythroblastic anæmia is an anæmia characterized by the presence of a few immature white cells of the myeloid series and immature red cells in the peripheral blood. Normoblasts and Ehrlich's megaloblasts occur, but the more usual cell is one with a basophil cytoplasm and a

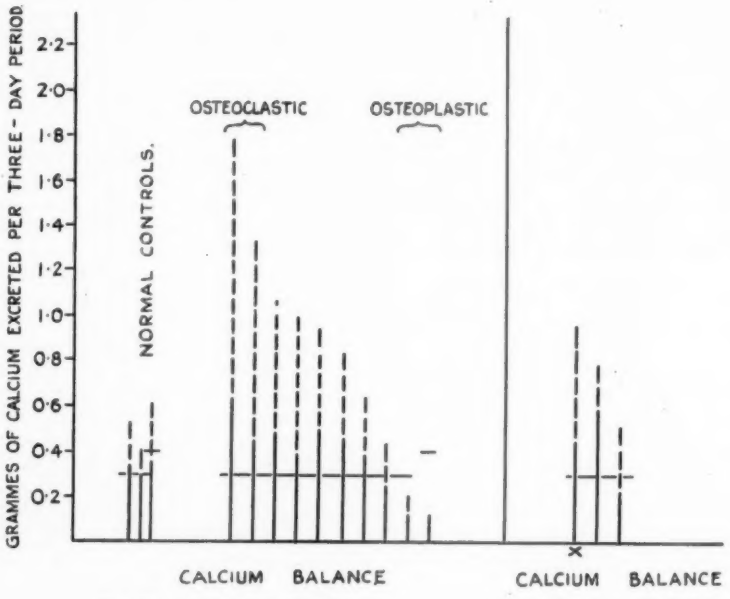


FIG. 11.—Carcinomatosis of bones.

FIG. 12.—Leuco-erythroblastic anæmia with osteosclerosis.

nucleus containing large nodes joined by a few stout threads of chromatin. Most of these basophil cells are primary erythroblasts, but some are hæmocytoblasts. The anæmia is not necessarily severe, nor is there usually a marked leucocytosis. It is possible that there is some underlying disturbance of metabolism affecting both hæmopoiesis and bone formation. Radiologically there is increased density of the bones.

We have examined the calcium balance in three cases showing this condition (fig. 12). In two the calcium excretion was approximately double the normal, and in the third it was normal. The figures for serum calcium, plasma phosphorus and plasma phosphatase were normal.

Case IV.—Myelosclerosis: Leuco-erythroblastic anæmia: Splenomegaly.

D. J., married woman, aged 37. (L. H. Reg. No. 41793/33.)

Clinical history.—Born in London. Rheumatic fever at the age of 12. Went to India for twelve months at the age of 20. When aged 28 travelled as ship's stewardess to India, China, and Japan. No history of tropical illness. Six years: typical major epilepsy; about twenty fits a year.

On examination.—Well-developed, sallow woman, with slight pallor of mucous membranes. Pulse 72, regular. Apex beat in fifth space in mid-clavicular line; apical presystolic murmur; no thrills. Blood-pressure 120/70. Non-tender splenic enlargement, half way to umbilicus. Wassermann reaction negative. Bleeding-time normal. Platelets 528,000 per c.mm. Blood-count (Dr. Janet Vaughan): R.B.C. 4,280,000; Hb. 70% (Haldane); C.I. 0·83; W.B.C. 5,330; polynuclear neutros. 64%; eosinos. 0·5%; lymphos. 22·5%; large monos. 3%; basos. 1·5%; transitional neutrophils 6%; neutrophil myelocytes 2·5%; two nucleated red cells per 200 white cells, both extremely immature; reticulocytes 1·6%; fragility of red cells normal. Fractional test meal: Free hydrochloric acid 0·15%; total acidity 60. Urine normal; Bence Jones protein absent.

Date	Serum calcium mgm. per 100 c.c.	Plasma phosphorus mgm. per 100 c.c.	Plasma phosphatase mgm.
1.4.32 ...	9·4 ...	4·0 ...	0·219
6.4.32 ...	9·6 ...	3·8 ...	0·132
24.11.33 ...	8·6 ...	3·2 ...	0·177
1.12.33 ...	9·8 ...	4·3 ...	0·289

Calcium balance:

Date	Intake	Calcium in urine	Calcium in fæces	Total calcium
26-29.11.33	0·306 grm.	0·52 grm.	0·47 grm.	0·99 grm.
29·11- 2.12.33	0·306 ,,	0·54 ,,	0·40 ,,	0·94 ,,
Mean	0·306 ,,	0·53 ,,	0·44 ,,	0·97 ,,

Radiograms of bones.—Pelvis, lumbar, thoracic and cervical spine show definite slight decrease in density, either uniform or finely mottled. Controlled radiograms of the long bones show nothing abnormal.

A wedge-shaped piece of bone was removed from the subcutaneous surface of the upper end of the right tibia.

Report (S.D. 2532/1933) (Professor H. M. Turnbull).

Macroscopic examination.—The specimen was received in formaldehyde and was a longitudinal slice (8·5 cm. long, 1·2 cm. wide and 1 to 1·2 cm. deep) taken from the upper two-thirds of the right tibia. The outer surface was covered with periosteum. The corticalis was from 0·3 to 0·4 cm. deep. It was white, ivory-like and showed an almost straight inner limit. Beneath it was a spongiosa showing conspicuous, longitudinal medullary spaces between thin sheets of bone. On a freshly sawn surface the medullary spaces contained pale yellow fat.

Microscopic examination.—(1) Four large bony plates were removed from the medulla with forceps. They were covered with adipose tissue. When the adipose tissue had been removed with a brush the plates were mounted in water and examined microscopically. None showed any osteoid zones.

(2) Two consecutive longitudinal slices of the specimen were decalcified under control of X-ray examinations and were embedded in celloidin. The decalcification consisted of four months in Müller's fluid followed by three weeks in 3% formic acid in 4% saline formaldehyde.

The bone consists of a compact corticalis, which contains Haversian canals and is from 2 to 2·5 mm. deep, and beneath this a spongiosa which is 4 to 5 mm. deep. The spongiosa consists of large medullary spaces which lie parallel to the corticalis and are separated by slender trabeculæ. A narrow zone of the corticalis, immediately beneath the periosteum, consists in most of its length of woven bone. Beneath this is a beautiful lamellar bone, which contains a few small areas of woven bone. The trabeculæ of the spongiosa also consist of perfect lamellar bone, and contain few lamellar systems. There is very little

evidence of active lacunar resorption. There are lacunæ upon the surface of trabeculæ of the spongiosa in a very few places, but only one is occupied by an osteoclast. There is very little evidence of active deposition. Osteoid seams are very rarely seen, and are then very shallow. The marrow is adipose.

The bone appears to be perfectly normal. It contrasts conspicuously with a slice (S.D. 1707/1933) taken from the middle-third of the tibia of E. C., a woman aged 43 years, who was thought clinically to have similar changes in the bones and marrow. Here the deeper part of the corticalis shows in places medullary cavities, while a subjacent spongiosa of long slender trabeculæ, similar to that described above in the tibia of D. J., is present in only part of the slice. In the medullary spaces in the deeper corticalis and extending from the corticalis to the full depth of the section (another 1 cm.), including the medullary spaces of the remnants of normal spongiosa, is a close spongiosa composed of numerous short stout trabeculæ of very irregular shape, which are seen to anastomose intermittently. These trabeculæ consist of systems of a less perfect lamellar bone—a type of bone intermediate between perfect lamellar bone and coarse-fibred woven bone. The systems are abnormally numerous, but not so numerous and small as in Paget's disease. Further, small areas of hæmopoietic marrow are scattered through the adipose marrow. This patient, E. C., subsequently died, and at necropsy (P.M.App. 582/1932) an extensive examination was made of her skeleton. The sections show that there is a widely spread osteosclerosis of the skeleton due to a remarkable excess of this abnormal spongy bone, which replaces normal spongiosa and fills medullary canals. The change is not, however, universal. Some parts of the long tubular bones show a normal structure. Further, hæmatogenous marrow is scanty or absent where the bone is normal, though always present, at least in many scattered patches in the adipose marrow, where the bone is abnormal. It is possible, therefore, that the skeleton of D. J. had undergone the same changes as that of E. C., but that the portion of tibia removed by operation happened to come from an unaltered area.—[H. M. T.]

Remarks.—This woman was sent to hospital on account of epilepsy, and routine examination revealed splenomegaly. Investigation of the splenomegaly showed the blood picture of leuco-erythroblastic anæmia. This led to examination of the skeleton by X-rays. It is to be noted that there were neither symptoms nor physical signs to suggest any abnormality in the skeleton.

Osteomalacia

In England to-day osteomalacia is a rare disease. Two types are found: The first is due to a diet deficient in vitamin D and calcium salts, and may be referred to as dietetic osteomalacia. It occurs as a result of the industrial depression in the North. One such woman, aged 33, was born in Darlington, Durham, and had always lived there. In 1922, immediately following her fourth pregnancy, she began to have pains in the left hip and back. By 1928 the total height had diminished by two inches, the limbs were bowed, the bones tender, and she was unable to walk unaided. The pelvic measurements were: Interspinous 25·4 cm., intercristal 28 cm., external conjugate 16·5 cm., transverse diameter at outlet 2·5 cm. The serum calcium was 9·6 mgm. per 100 c.c., and the plasma phosphorus 1·5 mgm. per 100 c.c. The calcium output was estimated in the urine and fæces for three three-day periods, the patient being kept on a weighed diet of known low-calcium content. The calcium output in urine and fæces was slightly less than in the control (fig. 13). Radiograms of the bones showed definite diminution in density with multiple spontaneous fractures. The calvaria showed innumerable pale, rounded, mottled shadows, many of them more than 1 cm. in diameter. There was a greatly deformed tri-radiate pelvis with fracture of the superior ramus of the os pubis on each side. A piece of bone removed from the inner aspect of the right tibia showed the abnormally deep osteoid zones of osteomalacia, associated with great osteoporosis. She was given a diet of high calcium content, together with large doses of calcium lactate and tablets containing vitamin D. Within three months the pain disappeared from the bones and she began to walk. Within six

months she was able to get about the house, to climb the stairs unaided, and to do her household duties. Radiograms of the bones showed union of many of the fractures, and complete healing of the defects in the calvaria.

The other cause of osteomalacia is idiopathic steatorrhœa (Gee's disease). This disease occurs in both sexes, and the history nearly always goes back to early childhood. The following features may be present: Fatty stools, dilatation of the colon, tetany, osteomalacia, anæmia, skin lesions, and infantilism. These manifestations develop in spite of an adequate diet. We must therefore suppose that there is some disturbance of gastro-intestinal function resulting in deficient production, absorption, or utilization, of one or more essential factors.

In fifteen cases recently investigated, steatorrhœa and disturbances of calcium metabolism were alone common to the whole group. In thirteen cases out of the fifteen the serum calcium was low. The plasma phosphorus was low or normal in

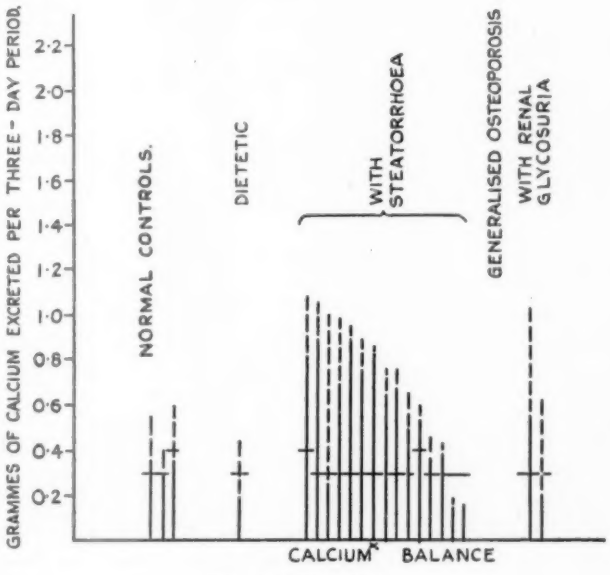


FIG. 13.—Osteomalacia.

ten cases—in the remaining five it was above the limits of normal. The height of the plasma phosphatase coincided approximately with the degree of active changes in the bones. Calcium balance estimations showed high figures for fæcal output and very low figures for urinary output (fig. 13). Changes in the skeleton were found in all cases investigated. Radiograms of the bones showed diminution in density, together with the deformities of osteomalacia. In three cases histological examination of portions of bone showed osteomalacia and osteoporosis. It would therefore appear that osteomalacia may occur, not only in persons deprived of calcium salts and vitamin D, but also in others with a defective mechanism for absorption or utilization of these substances.

Case V.—Idiopathic steatorrhœa, osteomalacia, infantilism, tetany, hypochromic anæmia.

W. H., a boy, aged 19 years. (L. H. Reg. No. 30387/1932.)

Clinical history.—Born in London. Normal until the age of 10 months, when he began to suffer from diarrhœa and wasting. Since that attack he has had many others in which his bowels are open up to six times daily, the motions being pale in colour. At 18 months he began to walk, but was rejected for school at 5 years of age because he could not yet walk properly. At 6 he had a particularly severe attack of diarrhœa with much wasting. At 9 he used to walk a little in the house and went to school with his brother, who usually carried him. He attended school until the age of 12. At 10 he was sent to the London Hospital by the school doctor, who claimed that the liver and spleen were enlarged. He was then well nourished but anæmic. The subcostal margins were splayed out. No other bone deformities were recorded. The abdomen was distended, and the liver and spleen just palpable. Ascites was suspected, but paracentesis abdominis revealed no fluid.

Blood-count: R.B.C. 3,300,000 per c.mm.; Hb. (Haldane) 45%; C.I. 0·68; W.B.C. 7,320 per c.mm.

At 12 he was thought to be suffering from abdominal tuberculosis and attended a tuberculosis dispensary for ten months. Marmite was added to his diet. He was ultimately discharged with a statement that he did not suffer from tuberculosis. At 14, following a cold in the head, he began to have cramps in the hands and feet. They came on in cold weather more particularly. The fingers and thumb were cramped together, with the wrist and elbow bent. The feet were turned inwards and the toes drawn up. The knock-knee was of long standing but had recently progressed rapidly. The mother stated that during his childhood she took him to almost every hospital in London on account of rickets. No history of bone disease or fractures in the family.

Clinical examination.—When first seen (March 16, 1932) the patient was a timid, dwarfed figure, the size of a boy aged 8, unable to read or write. Weight 3 st. 6 lb. Height 3 ft. 10 in. He could stand with support but was unable to walk. Definite clubbing of toes; slight clubbing of fingers. Abundant fine hair on scalp; none on face, axillæ, or pubes. Penis and testicles small as in a boy of 6. Skin: Pale, smooth, and delicate, no eruption. Teeth: Normal; certainly not hypocalcified. Tongue: Pale, but otherwise normal. Eyes (slit-lamp examination of lenses): "Some fine, bright opacities in the adult nucleus, so far as this is formed at present" (Mr. C. B. Goulden). Chvostek sign positive. Trousseau sign negative. Receding brow. Prominent occiput. Bossing of parietal bones immediately above ears. Circumference of skull 20 in. Spine: Slight scoliosis in upper thoracic region. Very prominent sacrum. Gross rickety rosary (fig. 14), lower ribs splayed out with wide subcostal angle. Deformity with forward bowing of both clavicles. Bowing of forearms with marked thickening of epiphyses at wrists. Severe genu valgum and thickening of epiphyses at ankles. Five inches separation at ankles when knees together. Hypotonia of muscles at all joints. Very great distension of abdomen. Divarication of recti with small umbilical hernia. Tip of spleen palpable. Heart and lungs normal. Radial arteries normal to palpation. Blood-pressure 105/65. Pulse regular, 86.

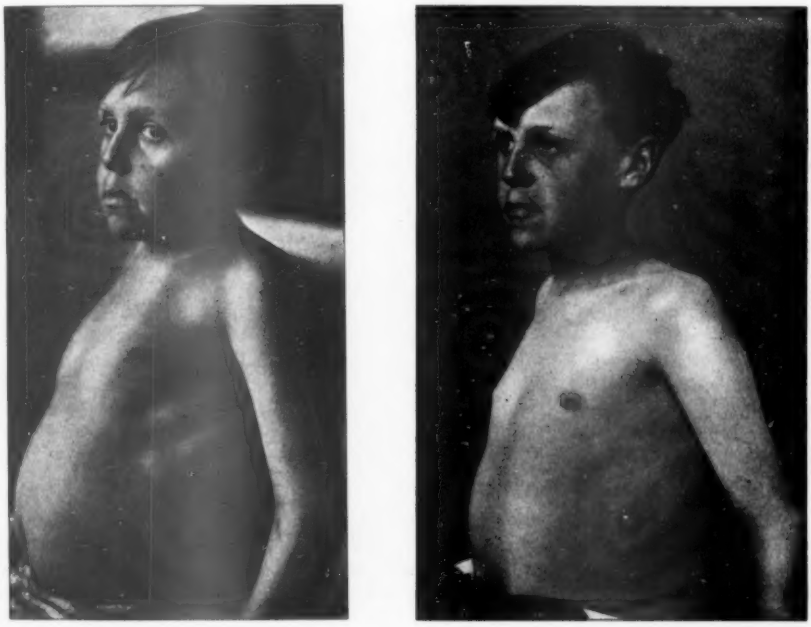
Special examinations when first seen.—Urine: Normal, no Bence Jones protein present. Blood-urea 0·037%. Sugar tolerance test: Fasting blood-sugar 0·054 grm. per 100 c.c.; blood-sugar after 50 grm. of glucose by mouth—at intervals of thirty minutes—0·105, 0·086, 0·064, 0·066, 0·060 and 0·083 grm. per 100 c.c. No glycosuria throughout.

Blood-count: R.B.C. 4,600,000 per c.mm.; Hb. (Haldane) 36%; C.I. 0·39; W.B.C. 4,200 per c.mm.; polys. 51%; lymphos. 45%; large monos. 1%; basos. 1%;

eosinos. 2%. The red cells are pale; anisocytosis is present, with an occasional megalocyte and many microcytes; poikilocytosis. Wassermann reaction negative.

Stools: Pale yellow-brown, total fat 50·7%, unsoaped fat 31·2%, neutral fat 8·8%, free fatty acid 22·4%, combined fatty acid 19·5%. Serum calcium 8·6 mgm. per 100 c.c. Plasma phosphorous 2·3 mgm. per 100 c.c. Plasma phosphatase 0·645 mgm.

Radiograms of bones: There is striking diminution of density of all bones examined. The eleventh and twelfth left ribs and twelfth right rib are fractured. The right clavicle shows an old fracture with angular deformity, and the shafts of the right fibula and right ulna are bowed. The pelvis is tri-radiate and grossly



March 1932.[1] May 1935.

FIG. 14.

deformed, the region of the acetabulum having been pushed in. At the growing ends of the long bones, especially the lower end of the radius, tibia, and fibula, there are wide, splayed-out, cup-like, pale spaces (Plate I, fig. 15, i). There are transverse lines of increased density up to seven in number in the metaphyses of many long bones, most marked in the lower end of the right tibia. Calvaria shows no increased thickness. The carpal and metacarpal bones are infantile. Union of the bones round the acetabulum is grossly delayed.

Radiograms of the kidneys and urinary tract are normal. Opaque enema examination: The lumen of the colon is normal, but the total length of the gut is long, chiefly because of increased length of the sigmoid. Calcium balance: The

[1] Reproduced by permission from the *Quarterly Journal of Medicine*.

calcium output was estimated in the urine and fæces for three three-day periods. The patient was kept on a weighed diet of known low calcium content (0·32 grm.). The calcium output in the urine was 0·02 grm.; that in the fæces was 0·84 grm.

Progress.—A high-calcium, low-fat diet was given, together with a preparation of vitamin D in solid form. Simple splints were applied to the outer aspects of each lower limb to correct the genu valgum. The patient was soon encouraged to walk alone. No further attacks of tetany occurred, and the serum calcium rose to 9·2 mgm. per 100 c.c. In a short time he learned his letters and was able to read simple words and to tell the time. The anæmia responded rapidly to Blaud's pill. He was given grains 40 daily, and the hæmoglobin rose from 34% to 80% in a month with accompanying clinical improvement. The present height is 4 ft. 3 in., and the present weight 5 st. 1 lb. The genu valgum is much reduced. The mucous membranes are red; hæmoglobin 100%. Radiograms of bones show considerable increase in the density of the cortices of long bones and complete healing of rickets at the epiphyses (Plate I, fig. 15, ii).

Generalized Osteoporosis with Renal Glycosuria

Two cases of generalized osteoporosis occurring in association with renal glycosuria have been studied. One of these showed, in addition, the histological characteristics of osteomalacia. Both cases showed a slightly raised serum calcium, a very low plasma phosphorus, a slightly raised plasma phosphatase, and an increased total calcium output (fig. 13). The chemistry of these cases differs from that in hyperparathyroidism in the absence of an absolute hypercalcæmia. Were parathyroid hyperfunction the cause of the condition the serum calcium figure corresponding to such a high calcium output in the urine would be 13 mgm. per 100 c.c. or more. In both cases the resemblance to hyperparathyroidism was sufficiently close to justify exploration of the neck. Normal parathyroid bodies were found, and the operation, of course, had no effect whatever on the course of the illness. The suggestion is put forward that in these cases the kidney fails to hold back phosphorus and calcium just as it fails to hold back sugar. The plasma phosphorus thus remains too low for normal bone formation to take place.

Case VI.—Osteomalacia with Renal Glycosuria.

J. F., medical practitioner, aged 29. (L. H. Reg. No. 31778/1931.)

Clinical history.—Born in London. 1927: Pains in right hip on walking; diagnosed as rheumatoid arthritis and treated wiih radiant heat; albumin and sugar found in urine. 1928: Weakness in legs and difficulty in walking. 1929: Could only walk with aid of a stick. 1930: Treated at Leysin with actinotherapy for osteoporosis. 1931: Very weak; had to use two sticks for walking. April 1931: Diagnosis of an osteomalacia-like condition made in Vienna; treated with adrenalin, prolan, pituitary extract, vigantol, and calcium lactate. October 1931: Severe pain in right thigh; could only walk a few steps, and had to take to bed.

Previous history.—Rickets as a child; wore irons for genu valgum. No history of fractures, diarrhœa, or tetany. Has always eaten a full and varied diet.

November 17, 1931: Admitted to the London Hospital. Moderately well nourished. Height 4 ft 10½ in. Weight 7½ st. Slight scoliosis with convexity to right in thoracic region and to left in lumbar region; moderate kypho-lordosis. Chest flattened from side to side, with increased anteroposterior and decreased lateral diameters. Slight tenderness on pressure over ribs and right iliac crest. Great pain on movement of right hip, but movement of hip not limited. Right leg shorter than left by half an inch, with severe genu valgum. No enlargement of epiphyses. Blood-pressure 130/75. Radiograms showed much thinning of bones; deformity with old fractures of both pubic bones; gross deformity of pelvis, with

right coxa vara; scoliosis with deformities of ribs. Sugar tolerance test: Fasting blood-sugar 0·057 grm. per 100 c.c. Blood-sugar after 50 grm. glucose by mouth, at intervals of thirty minutes, 0·057, 0·066, 0·10, 0·08, 0·034, 0·042 grm. per 100 c.c. Corresponding to every blood-sugar estimation the urine contained sugar. Wassermann reaction negative. Stools: Total fat 29·9%, unsoaped fat 14·6%. Blood-count: R.B.C. 5,800,000 per c.mm.; Hb. (Haldane) 104%; C.I. 0·89; W.B.C. 4,800 per c.mm.; differential count normal. Urine: Reaction acid; albumin (a cloud to 1/6th volume) and glucose present; deposit contained few leucocytes, but no casts. Bence Jones protein not detected. Renal efficiency tests: Blood urea 0·049%.

	P.S.P.	Urea concentration	Standard clearance
1st volume 80 c.c. ...	15·4% ...	1·02% ...	48·2% of normal
2nd volume 63 c.c. ...	14·3% ...	0·02% ...	42·4% „ „

Blood chemistry:—

Date	Serum calcium mgm. per 100 c.c.	Plasma phosphorus mgm. per 100 c.c.	Plasma phosphatase mgm.
17.11.31 ...	11·6 ...	1·8 ...	0·224
23.11.31 ...	10·0 ...	1·0	
27.11.31 ...	9·9 ...	1·0	
30.11.31 ...	9·5 ...	1·3	
4.12.31 ...	10·7 ...	2·8	
27.1.32 ...	10·1 ...	1·0	

Calcium balance (grm. per 3 days):—

Date	Intake	Calcium in urine	Calcium in fæces	Total calcium
20-23.11.31 ...	0·306 ...	0·39 ...	0·17 ...	0·56
23-26.11.31 ...	0·306 ...	0·49 ...	0·23 ...	0·72
Mean ...	0·306 ...	0·44 ...	0·20 ...	0·64

Treated with high calcium diet, calcium lactate and vitamin D, but became increasingly weaker with pain in limbs on attempting to move about.

March 14, 1933: Readmitted to the London Hospital. Radiograms showed great loss of calcium, so that it was difficult to distinguish between bone and soft tissues; old and recent fractures in superior ramus of ischial bone, left femur, right ulna, right tibia and right fibula.

March 17, 1933: Operation; exploration of neck (Mr. A. J. Walton). No parathyroid tumour was found in neck or mediastinum. Right inferior parathyroid body removed. Portion of tibia removed for histological examination.

Blood chemistry:—

Date	Serum calcium mgm. per 100 c.c.	Plasma phosphorus mgm. per 100 c.c.	Plasma phosphatase mgm.
14.3.33 ...	10·0 ...	1·6 ...	0·331
17.3.33 ...	Operation, exploration of parathyroids		
20.3.33 ...	10·0		
23.3.33 ...	9·2 ...	1·9	
1.4.33 ...	8·9 ...	1·2 ...	0·274

Progress after operation.—The clinical condition has remained unaltered for two years.

Report (*S. D.* 557/1933) (*Professor H. M. Turnbull*)

Specimen 1

Macroscopic examination: This specimen was said to be an enlarged right inferior parathyroid body. It was an ovoid body measuring 1·4 × 0·8 × 0·6 cm. It was soft, semi-fluctuating, yellower than a parathyroid body, and floated in formaldehyde. A cut surface resembled adipose tissue.

Microscopic examination: The specimen was cut into three pieces, which were placed respectively into formaldehyde for embedding in paraffin and staining with hæmatoxylin and eosin &c., into osmic acid for Gatenby's modification of Flemming's method, and into alcohol for Best's glycogen method.

The first piece consists of adipose tissue within which is a parathyroid body, 2 mm. in diameter. The other pieces consist of adipose tissue alone. The parathyroid body consists

chiefly of ballooned or "water clear" principal cells; there is one large and one small group of oxyphil cells. Although serial sections have not been cut, the large amount of adipose tissue revealed in the three blocks shows that the parathyroid body cannot have been of exceptional size.

Specimen 2

Macroscopic examination: This specimen was a longitudinal slice from the centre of the right tibia. It had been broken into a superficial and deep portion, the former being covered with periosteum. Reconstructed the slice was 3 cm. long, 1 cm. wide and 0·7 cm. at deepest. Beneath the periosteum there appeared to be a layer of compact bone of the thickness of paper. Beneath this was a spongy bone with narrow medullary spaces parallel to the periosteal surface.

Microscopic examination: The two portions were split longitudinally. One half of each was placed in formaldehyde. Four thin plates of bone were removed with forceps from these, and were examined in water. No evidence of osteomalacia could be found (provisional report, April 4, 1933).

The other two halves were decalcified in Müller's solution for four months, followed by 0·5% nitric acid in 4% formaldehyde and embedded in celloidin.

In the sections periosteum and extra-periosteal adipose tissues are present, but there is no compact bone beneath. The bone is spongy throughout, the medullary spaces enlarging towards the centre of the bone. The trabeculæ are narrow. Upon one or both surfaces of most of the trabeculæ there is a lamellar system which contrasts sharply in staining reactions with the bone in the centre. These superficial systems appear to consist of osteoid tissue which is frequently impregnated to a variable extent with finely granular calcium. This impregnation tends to be patchy. It usually but not invariably lies next the central bone, and extends for a variable distance towards the free surface. The free surfaces are usually covered with osteoblasts. These are very slender, and do not suggest activity of apposition. There is no active lacunar resorption. There appears, therefore, to be a very great excess of osteoid tissue and imperfectly calcified bone. The diagnosis is osteoporosis and osteomalacia. [H. M. T.]

Case VII.—Generalized Osteoporosis with Renal Glycosuria (previously shown by Dr. Ernest Fletcher).

J. W., man, aged 35. (L. H. Reg. No. 30120/35.)

Clinical history.—Born in London. Was bus conductor until 1931, when pain began in both feet, and later affected both thighs. December 1931: Became unable to walk except with sticks. (For further particulars see *Proceedings*, 1934, xxviii, 101.)

January 22, 1935, transferred to the London Hospital. Well-developed man, unable to walk without assistance. All movements of both hip-joints painful and limited; right worse than left. No tenderness on deep pressure upon bones, and no bony swellings. Heart normal. Pulse 96, regular. Blood-pressure 120/80. Clubbing of fingers. Radiograms of bones show gross changes, especially in the pelvis. Considerable osteoporosis. Fracture of right femur just below trochanter, its head being deformed, reduced in size, and poorly calcified. Fracture of superior ramus of symphysis pubis on left side. Osteoporosis of spine, separation between body and transverse process of first dorsal vertebra; fifth cervical vertebra has slipped forward on to sixth, and sixth on to seventh. Scattered, small, pale areas of osteoporosis in outer table of skull. Fracture of proximal end of second left metacarpal; fracture of fourth left metacarpal. Control radiograms of bones of limbs show moderate generalized decalcification, which is especially marked in the hands. The ivory corticalis of the metacarpals is very poor. That of the long bones is also poor, but to a lesser extent than appears in the hands. No renal calculi. Sugar tolerance test: Fasting blood-sugar 0·086 grm. per 100 c.c. Blood-sugar, after 50 grm. glucose by mouth, at intervals of thirty minutes, 0·117, 0·125, 0·133, 0·100, 0·083, 0·070 grm. per 100 c.c. Corresponding to every blood-sugar estimation the urine contained sugar. No Bence Jones protein found in urine.

Wassermann reaction incompletely negative. Stools: Total fat 19·5%; free fatty acid 3·3%; neutral fat 3·8%; soaps 12·4%.

Blood chemistry:—

Date	Serum calcium mgm. per 100 c.c.	Plasma phosphorus mgm. per 100 c.c.	Plasma phosphatase mgm.
26.1.35	11·3	0·9	0·520
29.1.35	11·5	0·4	
19.2.35	10·8	0·4	
21.2.35	11·5	0·7	0·462
25.2.35	11·7	0·8	
28.2.35	11·9	1·3	
4.3.35	10·3	1·0	
14.3.35	10·9	1·2	
27.3.35	11·1	2·3	
	Operation: exploration of parathyroids.		
28.3.35	11·9	1·1	
1.4.35	9·8	1·2	
3.4.35	10·4	1·1	
5.4.35	9·8	1·3	0·360
8.4.35	10·1	1·2	
11.4.35	10·1	0·9	

Phosphorus excretion in urine:—

	Time a.m.	Sp. gr.	Volume	Phosphorus per hour	Phosphorus per 100 c.c.
Patient	8.30	1043	—		
	9.30	1038	186 c.c.	119 mgm.	87 mgm.
	10.30	1034	187 c.c.		
First control subject	8.30	1026	—		
	9.30	1021	82 c.c.	34 mgm.	41 mgm.
	10.30	1020	84 c.c.		
Second control subject	8.30	1027	—		
	9.30	1023	30 c.c.	28 mgm.	74 mgm.
	10.30	1025	45 c.c.		

Calcium and phosphorus balance (grm. per 3 days):—

Date	Intake Ca	Intake P	Urine Ca	Urine P	Fæces Ca	Fæces P	Total Ca	Total P
3-6.2.35	0·306	2·02	0·75	1·70	0·58	0·48	1·33	2·18
6-9.2.35	0·306	2·02	0·60	1·56	0·57	0·50	1·17	2·06
19-22.2.35	0·306	2·02	0·32	1·76	0·70	0·62	1·02	2·38
22-25.2.35	0·306	2·02	0·26	1·46	0·44	0·39	0·70	1·85
Mean	0·306	2·02	0·48	1·62	0·56	0·50	1·04	2·12

Blood-count: R.B.C. 5,230,000 per c.mm.; Hb. (Haldane) 102%; C.I. 0·98; leucos. 8,000 per c.mm.; differential count normal.

March 27, 1933.—Operation: Exploration of neck (Mr. A. J. Walton). No parathyroid tumour was found in neck or mediastinum. Normal left inferior parathyroid body removed.

Progress after operation.—No tetany occurred. The clinical condition remained unaltered, and after five weeks' treatment with a high calcium diet and large doses of vitamin D there was no improvement with regard to the disability of the hips or lower limbs.

Report (S. D. 785/1935) (Professor H. M. Turnbull)

Specimen 1

Macroscopic examination: The right inferior parathyroid gland removed from the lower pole of the right lobe of the thyroid gland. It measured 1·5 by 0·6 by 0·4 cm. and weighed 0·135 grm. Externally it was smooth and brownish yellow. The cut surface was homogeneous, yellow tinged with brown and traversed by a few greyish white septa. The gland sank in formaldehyde solution.

Microscopic examination: A slice was fixed in 4% saline formaldehyde while two smaller pieces were put into Gatenby's solution for fat and Da Fano's fixative for the Golgi apparatus. All were embedded in paraffin.

The slice fixed in formaldehyde shows branching and anastomosing trabeculæ of glandular tissue in abundant adipose tissue. The trabeculæ are in general narrow. They are frequently formed by only two rows of cells; occasionally the cells are then columnar and surround an empty lumen. Most of the cells are chief cells. They are almost all vacuolated, but completely water-clear cells are relatively rare. One small group of trabeculæ is occupied almost entirely by pale oxyphil cells; other oxyphil cells are scattered throughout. There is in this slice no evidence of hyperplasia. A similar structure is seen in the piece subjected to Da Fano's method. In the portion treated by Gatenby's method, however, there is very much less adipose tissue, and the gland is composed of closely packed acini. Further, there is a rounded nodule, 2 mm. in diameter, in which septa separating acini are sparse. This nodule contains three cystic spaces containing a thin coagulum and red corpuscles. There is another, smaller, nodule in which the cells are usually large and columnar, and lie upon vascular trabeculæ to form a net enclosing wide spaces; the spaces contain a few shreds of coagulum. Both these nodules contrast with the rest of the glandular tissue in that the cells do not contain lipoid granules. There is, therefore, in these two nodules evidence of focal hyperplasia. The stain for the Golgi apparatus was not successful.

Specimen 2

Macroscopic examination: An accessory thyroid nodule from near the lower pole of the left lobe of the thyroid gland. This measured 2·1 by 1·5 by 0·7 cm. and weighed 1·25 grm.

Microscopic examination: A slice was fixed in 4% saline formaldehyde and a small piece in Da Fano's fixative, before embedding in paraffin.

Almost all the acini are lined with flattened epithelium and contain colloid; most are large. There are very few small tubular and round acini lined with cubical epithelium and either empty or containing colloid. The section shows, therefore, evidence of much colloid retention and of little active secretion or transference of colloid.

Specimen 3

Macroscopic examination: A longitudinal slice from the middle-third of the right tibia, measuring 3·5 cm. long by 1 cm. wide and from 0·6 to 1 cm. deep. The outer surface was covered with periosteum. The sawn surfaces showed grey bone traversed by many narrow pink longitudinal sulci running parallel to the periosteal surface.

Microscopic examination: The specimen was bisected longitudinally. One half was fixed in 4% saline formaldehyde, decalcified in Müller's fluid for seven weeks and 3% formic acid for two weeks, and embedded in celloidin.

In the corticalis a considerable number of Haversian canals have been widened to form Haversian spaces, containing adipose marrow. Active resorption is shown by numerous osteoclasts in two spaces. There is little active apposition. The osteoid seams are few and shallow. The bone, therefore, shows considerable osteoporosis but no evidence of osteitis fibrosa or osteomalacia. [H. M. T.]

Diaphyseal Aclasis.—R. W. B. Ellis, M.D.

A. H., a boy, aged 7 years. When he was 12 months old the mother noticed a hard lump at the upper end of the left tibia; since this time similar masses have appeared around the shoulders, wrists, knees, and ankles, and attached to the ribs, and have increased in size. The boy has been otherwise well, though there is now some disability in walking.

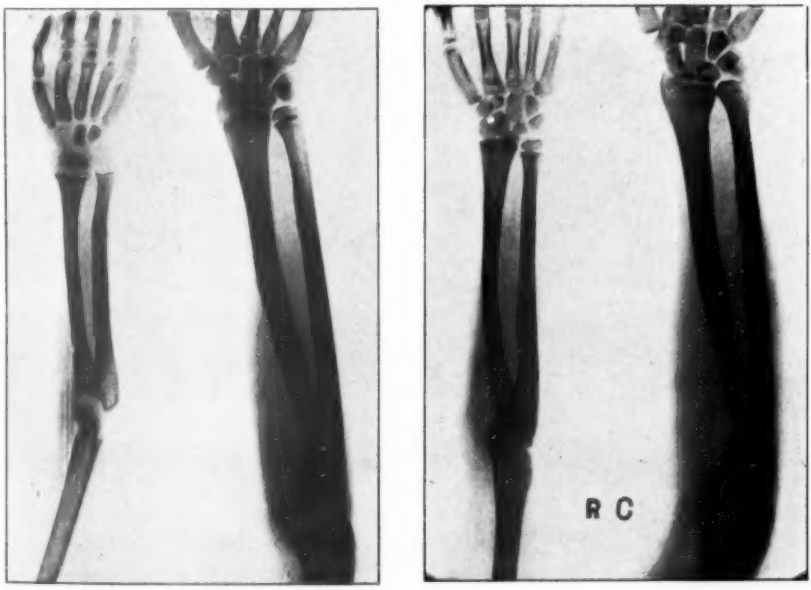
There are four other children in the family, three older and one younger, none of whom is similarly affected. Both parents are well, and the father is unaffected. The mother has a similar mass attached to her left clavicle.

On examination.—Well-developed boy of normal intelligence. Multiple bony tumours (*see* fig. 1) of varying size and shape attached to scapulæ, upper and lower ends of both humeri, radii and ulnæ; to the distal ends of the metacarpals,

PLATE I

FIG. 7.

Case III.—Radiogram showing osteoporosis of spine.



March 1932. (i) (ii) May 1935.

FIG. 15.

Controlled radiogram of forearm.

PLATE II

Control

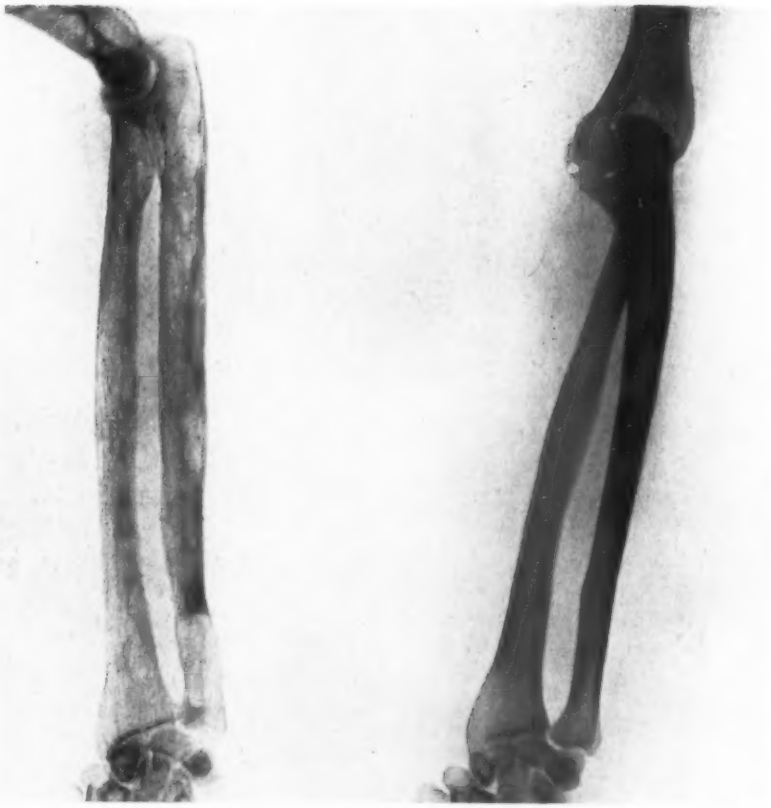


FIG. 2.

Case I.—Controlled radiogram of right hand and forearm before operation.

PLATE III

Control

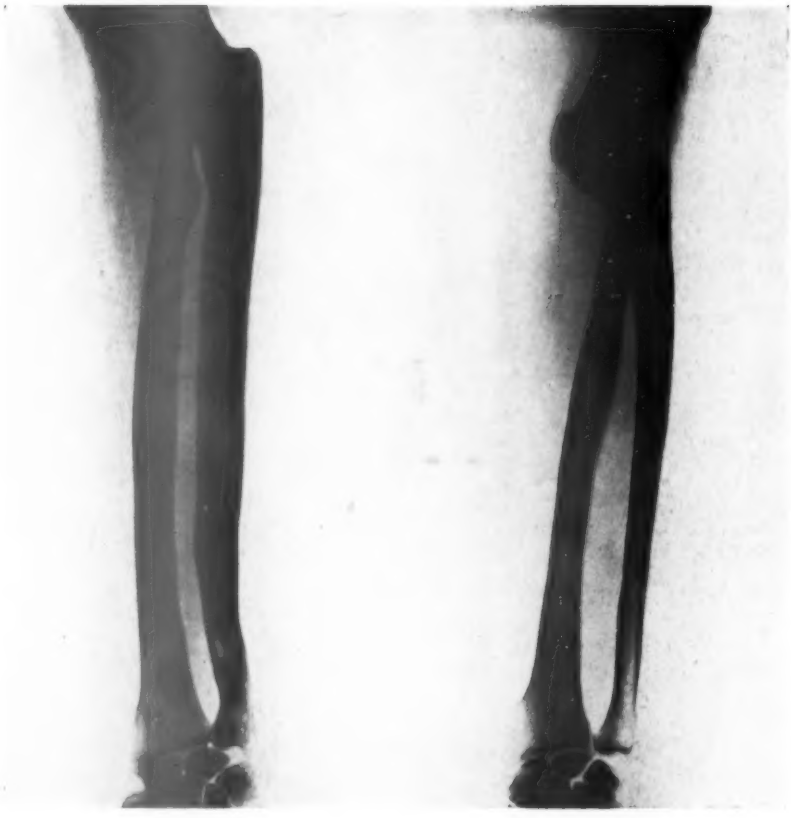


FIG. 3.

Case I.—Controlled radiogram of right hand and forearm two years after operation. The control was the same individual as before.

PLATE IV

Control

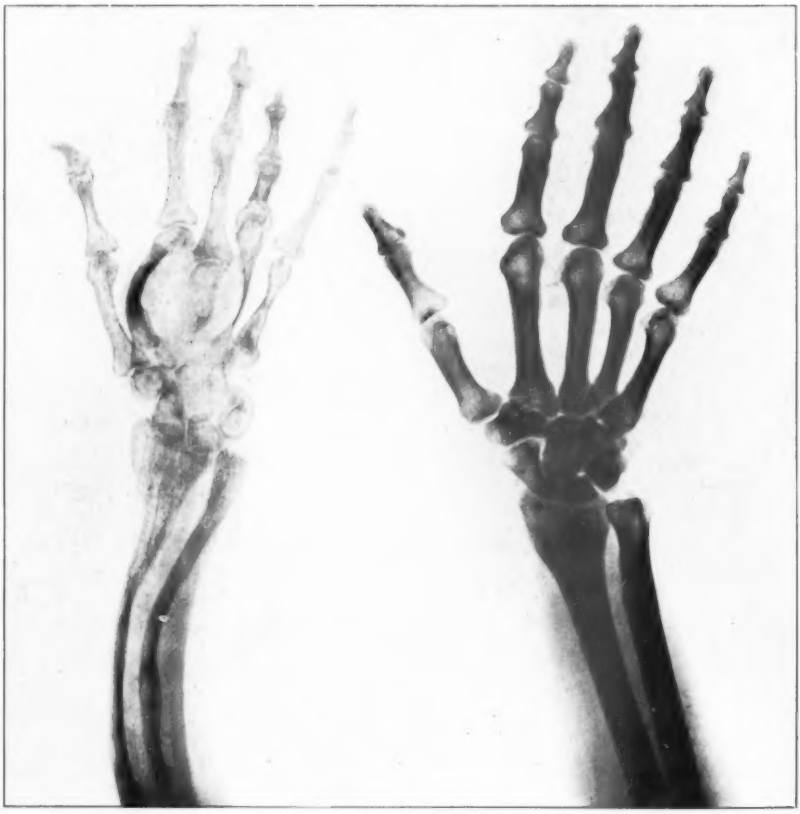


FIG. 4.

Case II.—Controlled radiogram of right hand and forearm before operation.

PLATE V

Control

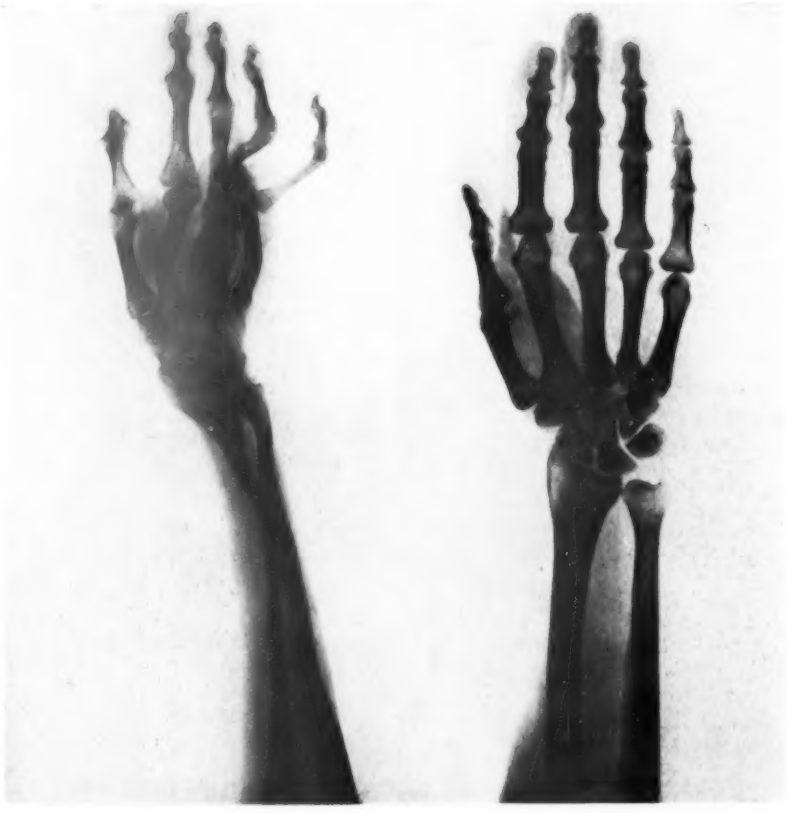


FIG. 5.

Case II.—Controlled radiogram of right hand and forearm twelve months after operation. The control was the same individual as before.

PLATE VI

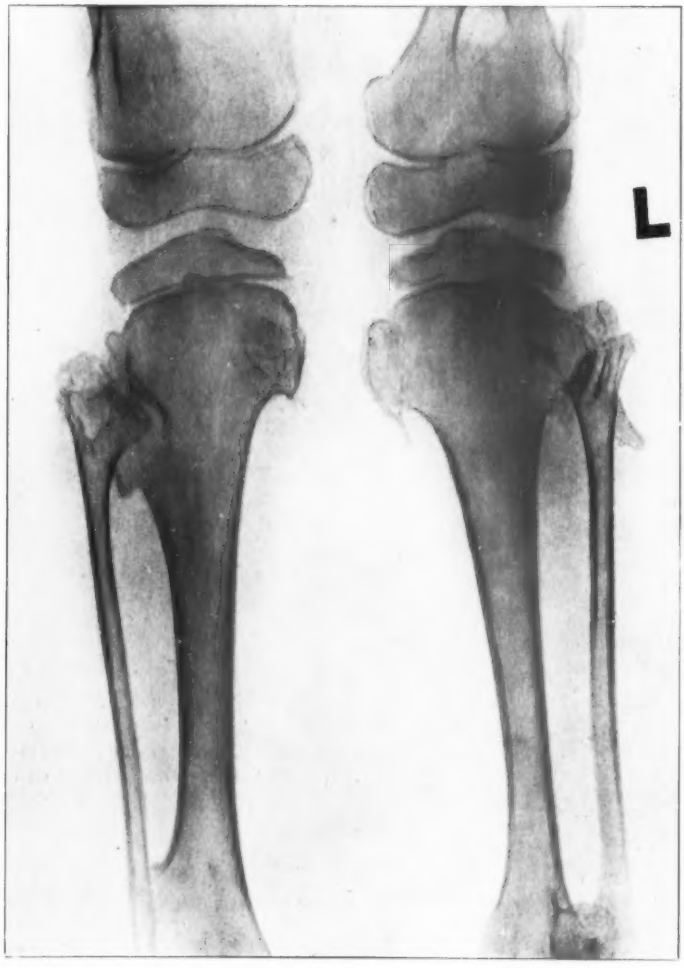


FIG. 2.

Skiagrams showing exostoses. (*See* p. 75.)

and the proximal ends of the phalanges; to the ribs at the costochondral junctions; to the iliac crests; to the upper and lower end of both femora, tibiæ, and fibulæ. The skull, spine, tarsal and carpal bones, and sternum are not affected. There is some limitation of movement of the affected joints.

Skiagrams show the masses to be exostoses. (*See* Plate VI, Fig. 2.)

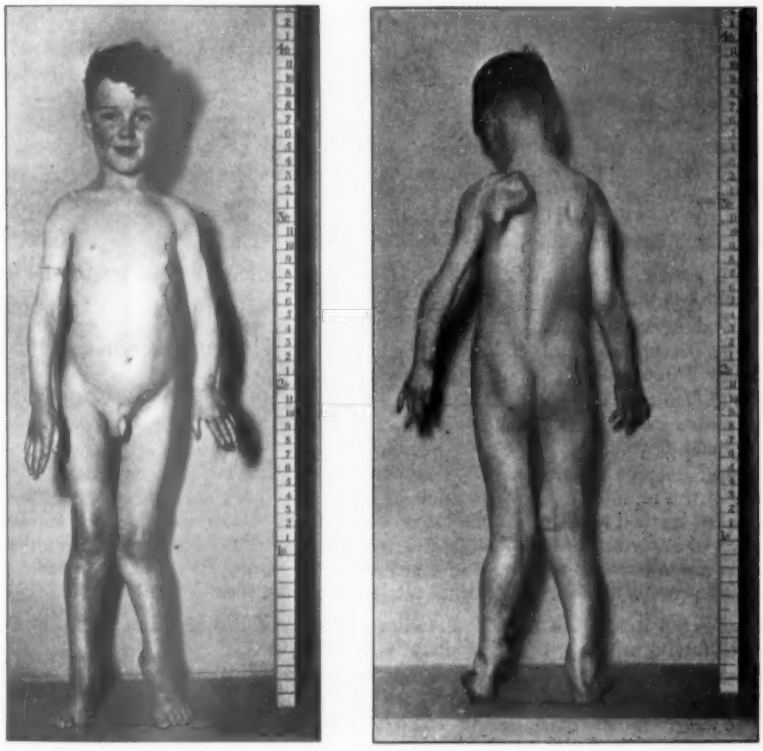


FIG. 1.—Diaphyseal aclasis: showing exostoses attached to costochondral junctions and left scapula, with deformity of extremities.

Multiple Exostoses in Father and Children. — C. P. G. WAKELEY, F.R.C.S.

R. S., male, aged 32 years. Has eighteen multiple exostoses: Radius, right and left; tibia, right and left; fibula, right and left; femur, right and left. Large swelling on right ileum, ? chondrosarcoma. Blood: Calcium, phosphorus, and phosphatase within normal limits.

Patient has four children. The elder three are affected; the fourth is only 10 months old.

Fragilitas Ossium in a Family showing both Thickening and Rarefaction of Bones, Relative Lymphocytosis and raised Serum Phosphatase with Absence of Blue Sclerotics and Otosclerosis.—H. S. LE MARQUAND, M.D., and F. H. W. TOZER, M.D.

Mrs. E. E., aged 43, has herself broken an arm three times, on the first occasion by lying on it; the last fracture occurred when she was aged 22. She is said to have been born with an abnormally shaped head. Central nervous system normal. Heart and lungs normal. Sigma reaction negative. Serum calcium = 10·3 mgm. per 100 c.c. Plasma phosphatase 1·0 c.c., plasma = 0·187 units.

Blood-count: R.B.C. 4,920,000; Hb. 110%; C.I. 1·1; W.B.C. 8,200. *Differential*: Eosinos. 5%; polys. 47%; lymphos. 45%; monos. 3%. The red cells appear normal.

X-ray evidence.—Skull: Very abnormal shape. (Plate VII, fig. 1.) Inion is a sharp point; antero-posterior diameter lengthened out of all proportion to vertical height. Bones of vault thin. Radii very slender. Old fracture of right wrist. Right scapula has defect in glenoid cavity. Femora show outward bowing in upper halves. (Plate VII, fig. 2.) Cortex thinned in these parts. Tibiæ and fibulæ: Cortex thickened. Tendency to tri-radiate pelvis. (Plate VIII, fig. 3.)

P. E., aged 7. Daughter of E. E. Broke right femur when an infant and again when four years old.

Central nervous system normal. Heart and lungs normal. Sigma reaction negative. Serum calcium 10·3 mgm. per 100 c.c. Plasma phosphatase 0·5 c.c., plasma = 0·506 units.

Blood-count: R.B.C. 5,900,000; Hb. 96%; C.I. 0·8; W.B.C. 7,800. *Differential*: Eosinos. 4%; polys. 34%; lymphos. 59%; monos. 3%. The red-cells appear normal.

X-ray evidence.—Bowing of ulnæ in upper halves. Femora show outward bowing of the middle-thirds with thickening of the cortex on inner side of bowing and coarse vertical striation in the lower metaphyses of femora. Marked thickening of cortex of anterior surface of tibiæ; suggestion of tri-radiate pelvis. Epiphyses of os calcis are condensed and on the right side the epiphysis is fragmented. Condensation present at base of proximal phalanges of big toes. Skull normal.

E. E., aged 9. Son of Mrs. E. E. Has broken an arm five times and a leg twice, owing to trivial injuries; first fracture at age of 9 weeks.

Central nervous system normal except for continuous fine horizontal nystagmus of type due to lost fixation. Heart and lungs normal. Serum calcium 10·1 mgm. per 100 c.c. Plasma phosphatase 1·0 c.c. = 0·442 units; 0·5 c.c. = 0·498 units.

Blood-count: R.B.C. 5,600,000; Hb. 93%; C.I. 0·84; W.B.C. 8,600. *Differential*: Basos. 1%; eosinos. 1%; polys. 20%; lymphos. 73%; monos. 5%. The red cells appear normal.

X-ray evidence.—Bowing of upper ends of ulnæ. Widening and outward bowing of femora. Malformation of both glenoid cavities. Sclerosis of middle-thirds of shafts of both tibiæ. Tri-radiate pelvis. (Plate VIII, fig. 4.) Condensation but no fragmentation of epiphyses of os calcis. Increased density of epiphysis at base of proximal phalanges of big toes. Skull shows similar deformity to that of mother, but not so marked.

Parents of Mrs. E. E., died at ages of 60 and 68 respectively. Normal facial appearance (photographs seen). No signs or symptoms of fragilitas ossium. Mrs. E. E. had four sisters, of whom two died in infancy—of bronchitis and summer diarrhœa respectively. Of the two remaining, one, Mrs. A. E., is of normal appearance and has no clinical history of fragilitas ossium. The latter

PLATE VII

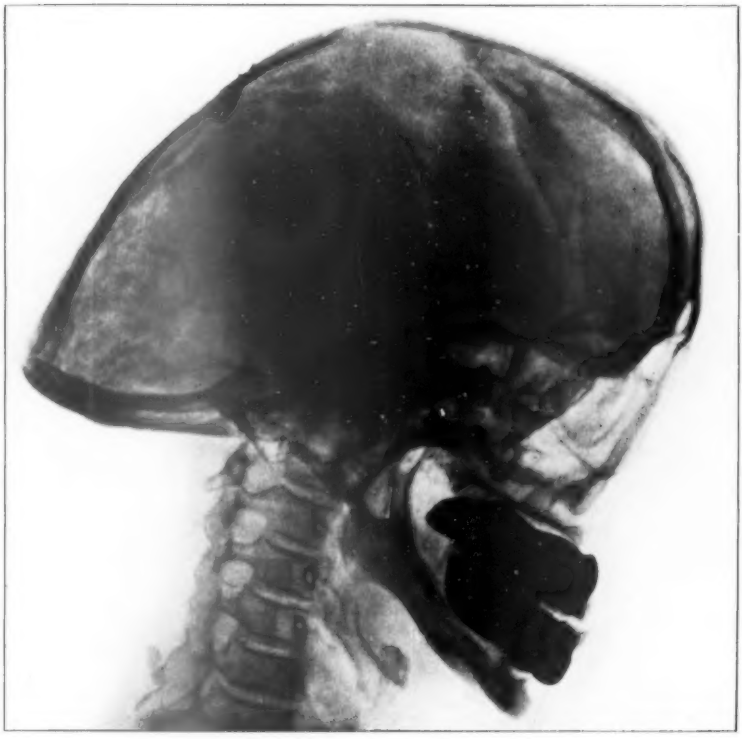


FIG. 1.

Mrs. E. E. Shape of skull probably due to compression of soft bone *in utero*. Irregular thinning of tables of skull.

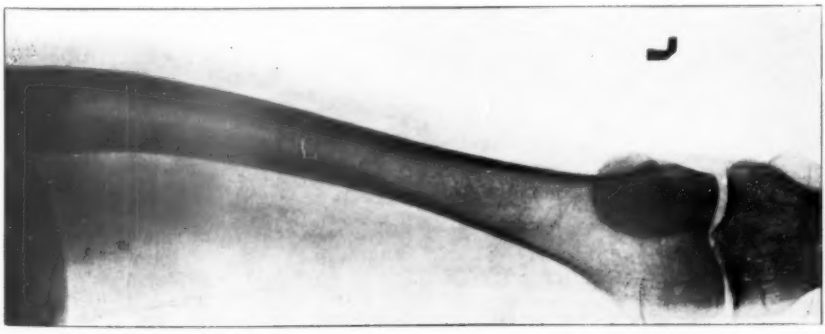


FIG. 2.

Mrs. E. E. Femur: Decalcification near knee and thickened cortex in mid third.

PLATE VIII

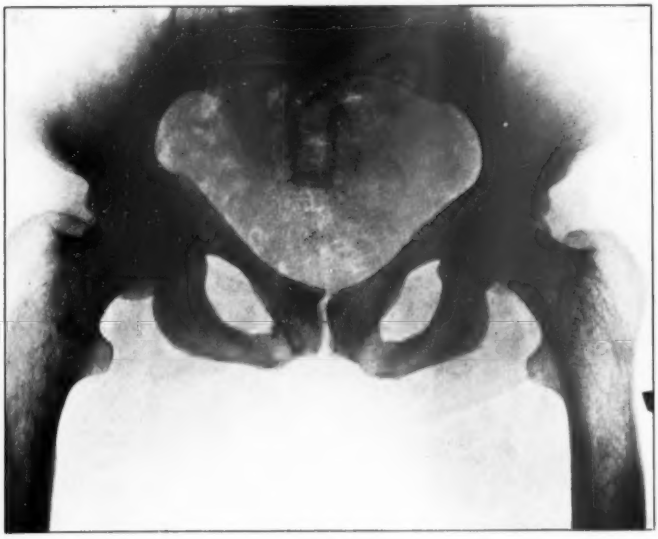


FIG. 3.

Mrs. E. E. Tri-radiate pelvis. Decalcification in parts of femora.

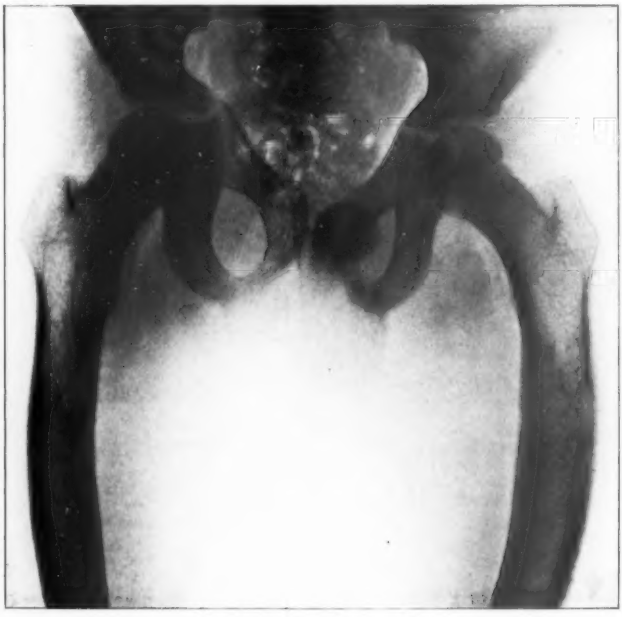


FIG. 4.

Eric E. Tri-radiate pelvis. Decalcification of upper ends of femora, thickening of cortex and bowing in middle of shafts.

has three normal children; viz., daughter aged 6½; daughter aged 4; son aged 2; in none of these are there any signs of fragilitas ossium.

The remaining sister, L. C., aged 32, unmarried, is also normal.

The whole family of Mrs. E. E. consists of her husband and two children. The husband and husband's family are also normal. The children were shown at the meeting.

It thus appears that the case is one which has arisen *de novo*.

Osteitis Deformans.—PHILIP ELLMAN, M.D.

J. L., aged 56. Complains of generalized dull aching pain in all limbs but especially confined to the lower back, hips, and lower limbs. There has also been increasing stiffness of the lower back and patient is unable to hold himself in the erect position. These symptoms were first noticed twelve years ago, but for the last four years patient has noticed changes in the shape of the lower limbs, and a thickening of the skull, which has necessitated a larger size of hat. General condition has not been materially affected and remains reasonably good. He has observed that his height has diminished by 2 in. during the last few years.

Previous history.—Fracture of left forearm twenty years ago and of right forearm four years ago. No history of family involvement.

Condition on examination.—Patient has a distinct stoop, and carries his head forward; shoulders rounded; marked dorsal kyphosis; lumbar curve almost obliterated. Head enlarged (circumference 25 inches); frontal and parietal bones markedly thickened and protuberant. Lower limbs (femora and tibiæ) curved, thickened and bent. Upper limbs not markedly curved. Pelvis widened. Chest expansion limited to 1½ in.

Cardiovascular system: Heart not enlarged; regular rhythm, short systolic murmur at apex. Aortic second sound relatively accentuated; vessels thickened and tortuous. Blood-pressure 140/80. X-ray examination of the skeletal system (Dr. George Vilvandré) is characteristic, and shows marked transparency of bones, which stands out in striking contrast to the increased thickness. The increase in thickness and bowing of the long bones, their hazy outline and irregular increase in density with some clear intervening areas, the accentuation of the bone lines in the longitudinal direction are well seen in the films. The skull bones show haziness, thickening, loss of outline, and replacement of the normal bone texture by a characteristic "cotton-wool" appearance. The pituitary fossa is larger than normal. The bones of the pelvis likewise show characteristic changes.

Biochemical investigations (Dr. H. E. Archer): Blood calcium 10 mgm. per 100 c.c.; blood phosphorus 3·7 mgm. per 100 c.c.; blood phosphatase 0·83 units. Wassermann reaction negative. Blood-count: No gross abnormality. It will be seen that the blood calcium and phosphorus figures are within normal limits.

The plasma phosphatase (normal average = 0·15 units) is characteristically high. The correlation between the plasma phosphatase content and intensity of the symptoms and X-ray findings, first suggested by Kay, appears to hold good.

The physical features appear to correspond very closely to Sir James Paget's original description of this disease, beginning in middle life, and showing slow progress, affecting principally the skull and lower limbs, with markedly increasing dorsal and lumbar curves.

The patient has been treated with mercury and potassium iodide, arsenic, and general light baths with no appreciable benefit.

Two Cases illustrating the "Rheumatoid" Type of Arthritis.—FRANCIS BACH, M.D.

I.—D. H., female, aged 30, domestic servant.

For many years has suffered from chilblains during the winter. Two or three years ago began to complain of pain and stiffness in hands and feet, gradually progressive; recently, in addition, pain and limitation of movement in elbows and shoulders, and swelling of knees.

On clinical examination.—General health good. Skin of fingers tightly stretched—"as a glove," atrophic in appearance, and of subnormal temperature. Slight fusiform swelling of proximal interphalangeal joints of both hands, and limitation of flexion of all fingers. Peri-articular swelling and limitation of movement, with marked creaking, in wrists and elbows. Peri-articular swelling of knees.

The patient has been under treatment for two years, with rest in bed, splinting, physical treatment, chemotherapy, and so on, and her general condition has improved.

Special investigations.—Sedimentation rate on several occasions slightly raised: 20 to 30 mm. fall at end of first hour. Serial skiagrams of the right hand showed a gradual onset of slight, generalized decalcification of bone, and thinning of the cartilage of the first metacarpo-phalangeal joint and the carpus.

Blood-count: R.B.C. 4,710,000; Hb. 82%; W.B.C. 5,300. Fractional test meal: low free hydrochloric acid content; barium meal: no abnormalities in stomach and intestine. Blood Wassermann reaction negative. Gonococcal-fixation test negative. Blood fibrogen increased.

Note.—A generalized decalcification of bone appears to be an important early sign in "rheumatoid arthritis," and possibly is a valuable feature in differential diagnosis.

Oppel, Leriche, Simon, and many others have performed parathyroidectomy for "rheumatoid arthritis" and spondylitis-ankylopoietica, in the belief that disturbance in calcium metabolism is possibly a causative factor in this disease. In certain cases, immediate relief of pain and stiffness has been noted. This patient is presented as a possible candidate for such treatment.

II.—W. F., female, aged 28. Previous health has been good. No family or personal history of tuberculosis or rheumatic fever.

About twelve years ago, first noticed roughness of nails of fingers and right thumb, and swelling and pain in left wrist; also, a red patch on left cheek. Later, complained of pain and swelling in toes and fingers. The pain in the feet ceased, but the pain and swelling in the hands grew worse.

Ten years ago, she was shown by Dr. Henry MacCormac,[1] at a meeting of the Section of Dermatology, as a case of "lupus pernio." Since then, the periarticular deformity and disability of the hands have increased.

On examination.—Slight woman: somewhat under weight. The fingers, all except the ring finger of the right hand, have a fusiform contour. Marked peri-articular swelling of proximal interphalangeal joints of both hands. Marked striation of all the finger nails. Erythematous plaques present on both cheeks and on the nose.

A skiagram of the hands shows characteristic "punched-out" areas, and rarefaction in some bones—but there is no generalized decalcification of bone.

Special investigations.—Blood Wassermann reaction negative. Skiagram of chest shows nothing abnormal except slight enlargement of the hilus glands.

Note.—The case is shown as one of lupus pernio (benign lymphogranuloma). It presents a picture of trophic changes in the extremities, with the "rheumatoid" type of arthritis affecting the hands.

[1] *Proceedings*, 1925, xviii (Sect. Derm., 42).

Idiopathic Steatorrhœa with Early Osteomalacia.—FREDERICK LANGMEAD, M.D.

F. R., aged 23, post-office sorter.

The patient was perfectly well until February 1934, when he experienced stiffness and tightness of the muscles of the back, associated with a dull ache but no sharp pain. He was able to continue with his work. Towards summer the ache became less, and by August he felt quite fit again.

In September 1934 he was knocked down while riding a motor-cycle, but, beyond a severe bruise of his right ankle, he noticed no injury. In the following October the stiffness and tightness of the muscles returned, and rapidly increased in severity, until by January 1935 his back and thighs felt so stiff and painful that he could scarcely walk at all, and had great difficulty in getting up after he had been sitting. Pain was most marked in the lumbar region, and the adductor group of muscles of the thighs felt most stiff. He thought that during the last few weeks he had been passing more urine than usual.

The patient tends always to be constipated; the diet which he was having at this time seems to have been adequate, as regards vitamins and other necessary food. There has never been any cough or chest trouble.

There is nothing relevant in the family history, except that the elder brother has tuberculosis of the spine.

On examination (March 10, 1935).—He was markedly anæmic, and early clubbing of the fingers was noted. He had an abnormal, awkward gait, which did not fit in with any special type. Lumbar lordosis and dorsal kyphosis were present, and there was great tenderness in the region of the sacro-iliac joints.

X-ray examination of the pelvis on March 13 showed "some generalized decalcification, with localized destructive changes in both pubic bones, with fractures; slight compression of first lumbar vertebra."

Investigations (March 20).—Serum calcium, 9·4 mgm. per 100 c.c.; plasma inorganic phosphates (as P) 1·99 mgm. per 100 c.c.

Blood-count: R.B.C. 3,200,000 per c.mm.; Hb. 52%; C.I. 0·8; mean diameter of red cells, 7·4; W.B.C. 4,600 per c.mm. *Differential*: Polys. 48%; lymphos. 50%; eosinos. 2%.

March 25: Further examination showed generalized decalcification of the bones of the limbs.

An estimation of the fat in the stools was made, as the stools appeared greasy and were extremely offensive. This showed:—

Total fatty bodies	37·6%	by	weight	of dried stool.
Combined fatty acids	17·6%	,,	,,	,,
Free fatty acids	17·85%	,,	,,	,,
Unsplit fats	2·15%	,,	,,	,,

The patient was put on a full diet, with the addition of radiostoleum and iron and ammonium citrate, and on April 7 the following estimations were carried out:—

Serum calcium 10·5 mgm. per 100 c.c.; plasma inorganic phosphates 1·79 mgm.%; plasma phosphatase 0·19 units per c.c.; blood-sugar three hours after meal 0·126 gm.%.

A fractional test-meal was carried out, and showed marked hyperchlorhydria but otherwise no abnormality. At this time also a blood-count showed improvement. R.B.C. 4,200,000 per c.mm.; Hb. 55%; C.I. 0·6; average size of red cells 7·2 (some anisocytosis); W.B.C. 6,800 per c.mm. The differential count did not differ materially from the previous count.

April 15: Daily intravenous injections of 5 c.c. of a 10% solution of calcium gluconate were begun. These were continued for sixteen injections.

During this time the patient had remained in bed, and had gradually lost the pains of which he had previously complained. He took his food well, put on seven pounds in weight, and his colour improved rapidly. There was at no time any polyuria, and the regular routine examinations of his urine showed no abnormality.

Before the calcium injections were begun, the calcium output in the urine was estimated over a period of twenty-four hours; another patient (suffering from sciatica, and also on a full diet) was used as a control. The patient passed only 43·87 mgm. of calcium in the urine, over twenty-four hours, while the control passed 248·8 mgm.

April 30: After the calcium injections, the patient was again examined by X-rays.

Report.—"The degree of osteoporosis in tibia and fibula remains very much *in statu quo ante*. There is, however, a very striking regeneration of new bone formation in both pubic bones, and the solutions of continuity have been almost completely healed by direct bone formation."

An examination of the stools for tubercle bacilli proved negative.

A further blood-count on May 8, showed R.B.C. 4,700,000; Hb. 60%; C.I. 0·6; W.B.C. 7,000. *Differential*: Neutrophil polys. 66%; lymphos. 31%; large monos. 2%; eosinos. 1%.

Section of Obstetrics and Gynæcology

President—EARDLEY HOLLAND, F.R.C.S.

[*June* 21, 1935]

The Ætiology of Fibrocystic Tumours of the Ovary

By ELIZABETH HERDMAN LEPPER, M.B.

WHATEVER branch of medicine we take up we all come across some problem which especially intrigues us because we feel sure that the explanation must be quite a simple one, and that we could find the solution if we had enough material to examine. The association of ascites with fibromata of the ovary has been such a problem for me. The reasons given in the textbooks for the occurrence of the fluid have not satisfied me, as all of them ought to apply equally to certain fibroid tumours of the uterus and they do not.

I have therefore, during the past fifteen years, kept most of the fibrous tumours of the ovary which have been removed at the Elizabeth Garrett Anderson Hospital, especially those of small size and all the cystic fibromata.

FIG. 1.—Fibroma of ovary 6 × 5 × 5 in. (Surgeon Miss Landau.)

The pedicle of the tumour was twisted and peritonitis was present. *A*, solid fibroma; *B*, cystic spaces due to degenerative changes in the fibroma.

I am much indebted to my surgical colleagues for giving me every assistance in their power, even to sending the specimens unopened when possible.

When I came to examine the material which had collected I found it was possible to see all the intermediate stages between a solid fibroma and a simple serous cyst.

It is generally agreed that a fibroma arises from the connective tissue of the ovary and is associated with the presence of free fluid in the abdomen in 30 to 80% of the cases according to different observers (fig. 1). It seems to have been forgotten

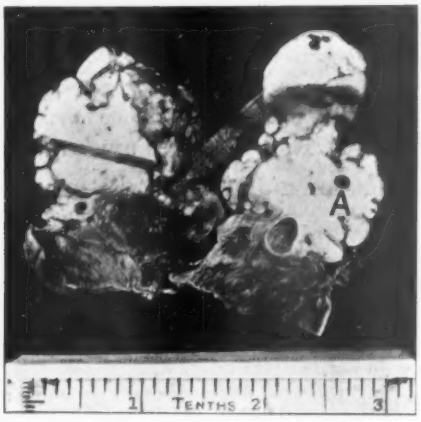


FIG. 2.—Warty fibroma. Tumour 2¾ × 1¾ × 1¼ in. (Surgeon Miss Bolton. *A*, small cyst lined by germinal epithelium.

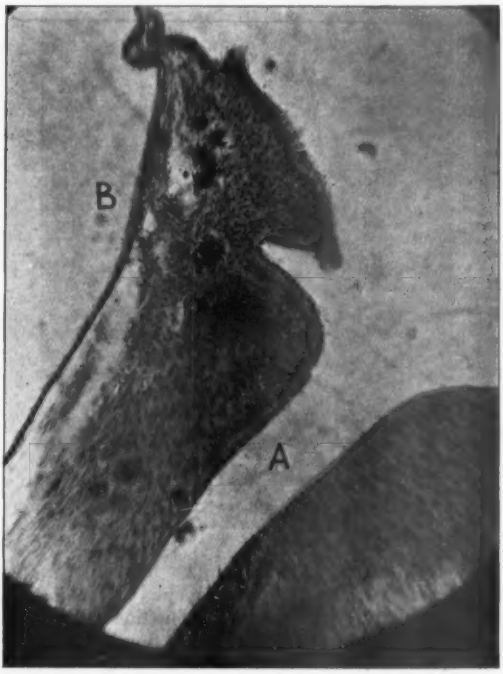


FIG. 3.—Microphotograph of fibroma. Tumour 3 × 1¾ × 1⅛ in. (Surgeon Miss Rawlins.) The surface was slightly irregular. *A*, narrow cleft on the surface of the fibroma covered by germinal epithelium, this disappears on the exposed surface of the tumour; *B*, portion of a superficial cyst lined by similar epithelium. Magnification × 90.

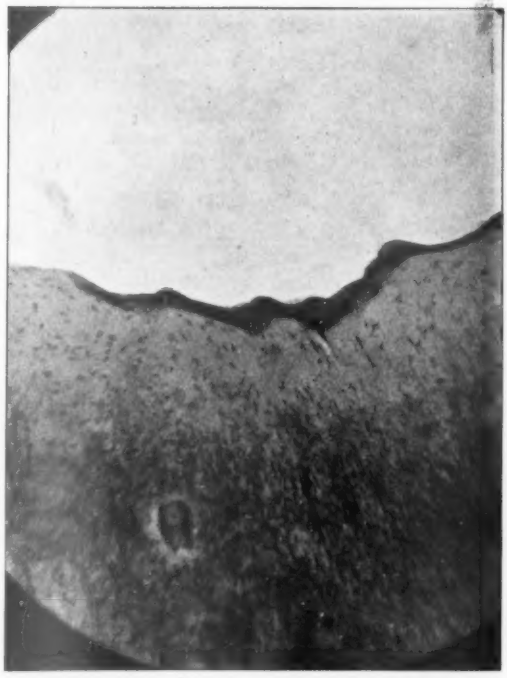


FIG. 4.—Microphotograph of the epithelium on the surface of a fibroma, cut obliquely. Magnification × 105.

that there is a covering of germinal epithelium to the tumour. Orthmann in his textbook on Gynæcological Pathology describes this epithelium and points out that it is most easily seen on the small warty tumours especially where it is folded down into the substance of the fibroma (figs. 2, 3, and 4).

The germinal epithelium can also be found on the surface of the large smooth tumours, but it is often patchy in distribution or has been so much thinned out that it is difficult to recognize. Various degenerative changes may be present, the cells may be swollen and the nuclei stain badly, or they may be tall, resembling columnar epithelium. It then seems to correspond to the "Flimmer" epithelium of the German authors. The slide I have put under the first microscope shows nearly all these appearances in close proximity to each other.[1]

The thing that struck me first about this series of tumours was the large amount of fluid which could be secreted by the germinal epithelium provided it was protected by being shut up inside a cyst—12½ pints in one case (fig. 8).

Another surprising thing was the frequency with which these cystic fibromata were associated with free fluid in the abdomen (fig. 5). I have not seen it referred to in the literature, and did not know it occurred until I went through the clinical notes of the cases I had selected for this demonstration.

If the germinal epithelium can secrete so much fluid when it is shut up inside a cyst, there is no reason why it should not do so on the surface of the ovary, provided the cells are healthy (fig. 9). I believe, therefore, that it is the germinal

[1] Slides were also shown illustrating the epithelium lining the cysts.

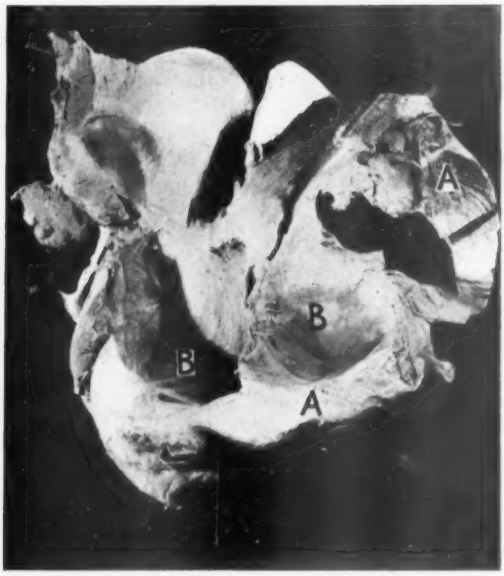


FIG. 5.—Cystic fibroma. (Surgeon Miss Landau.)
Tumour 6½ × 5 × 5 in. Five pints of free fluid in abdomen. *A*, fibrous wall; *B*, cysts lined by smooth shining membrane.

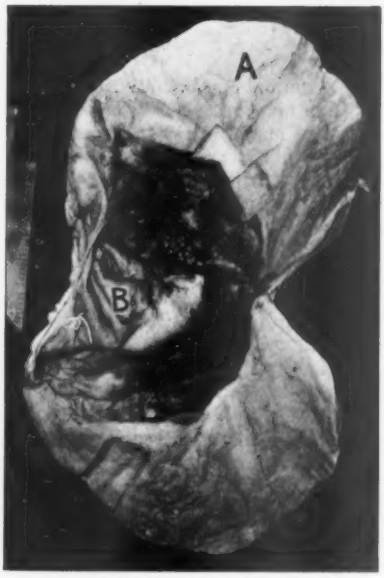


FIG. 6.—Cystic fibroma. (Surgeon Miss Sylk.)
Tumour 9 × 6 × 5 in. A small amount of free fluid in the abdomen. *A*, solid part of tumour; *B*, cystic portion lined by shiny membrane. Hæmorrhage into the cyst has occurred.

FIG. 7.—Cystic fibroma. (Surgeon Miss Bolton.)
Tumour 6 in. in diameter. Inside of cyst. *A*, fibrous plaque in wall; *B*, warty papillomata on its inner surface.

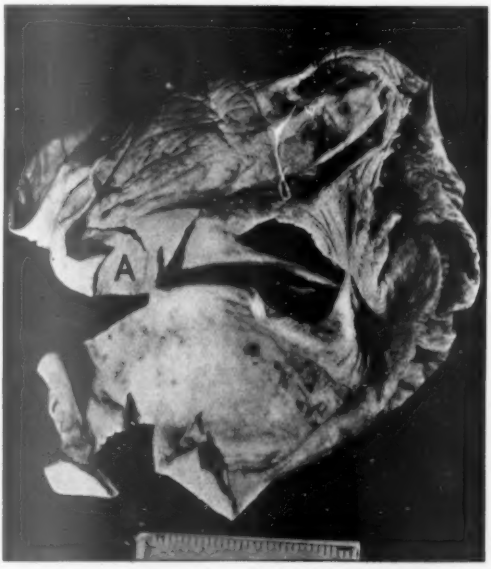


FIG. 8.—Cystic fibroma. (Surgeon Miss Mocatta.)
Tumour 8 in. in diameter. It contained 12½ pints of fluid. There was about a pint of free fluid in the abdomen. *A*, cut surface of fibrous wall where section has been taken shown in next photograph.

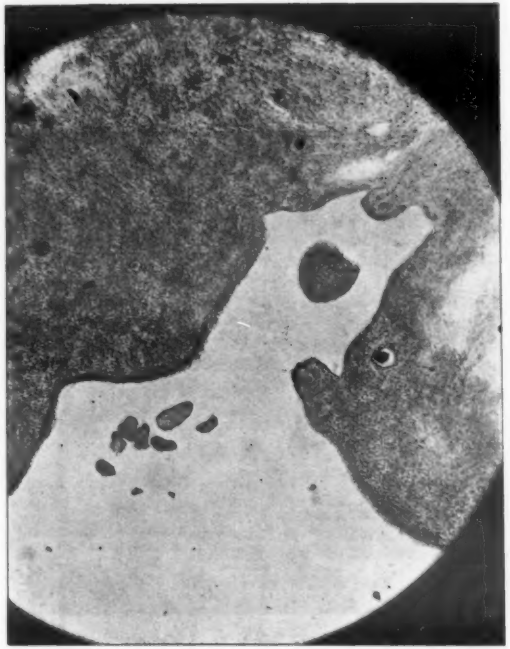


FIG. 9.—Microphotograph of section of fig. 8, showing small papillomata on the surface covered by germinal epithelium. Magnification × 40.

FIG. 10.—Uterus with both ovaries. (Surgeon Miss Rawlins.)

On the right side a thick-walled cyst 6 in. in diameter. 5½ pints of free fluid in abdomen. *A*, warty fibroma attached to remains of ovary; *B*, fibrous wall of cyst; *C*, papillomata inside cyst.

epithelium on the surface of the fibromata which is responsible for the ascites associated with these tumours. This is the fundamental way in which they differ from fibroids of the uterus.

This view is supported by the occurrence of the so-called physiological ascites which is frequently seen during pelvic operations. I am told by my surgical colleagues that there is nearly always several c.c. of fluid in the female pelvis. It is probable that this fluid is secreted by the germinal epithelium on the surface of the ovary.

In conclusion I would suggest that the fibromata, the fibrocystic tumours and the simple serous cysts, should be all grouped together as germinal-celled adeno-fibromata.

REFERENCE

ORTHMANN'S "Handbook of gynæcological pathology," London, 1904, p. 108.

Decidual Cast in Suspected Ectopic Gestation

By S. GORDON LUKER, M.D., F.R.C.S., F.C.O.G.

THE patient, aged 24, married nine months, was seen by me, in consultation, on April 24, 1935, complaining of pain in the pelvis and bleeding from the vagina, following amenorrhœa of nine weeks' duration. The last menstrual period had taken place February 19 to 23. About March 19 there was a slight amount of bleeding intermittently for two or three hours instead of the normal period. There was no bleeding from then until April 23, when the patient began to lose blood on returning from a long motor run. The loss was like a show—very slight. There was some slight suprapubic pain intermittently. Some nausea had been present during the whole of the nine weeks' amenorrhœa and the patient had no doubt that she was pregnant.

Condition on examination.—The pulse was 88, and the temperature was normal. The uterus was slightly enlarged and softened, and no tumour of the appendages could be felt. The patient was sent to a nursing home for observation, the diagnosis resting between threatened miscarriage and an ectopic pregnancy.

During the next three days there were intermittent attacks of pain in the pelvis and a continuous slight discharge of brown-red blood. Three days later, on April 27, the patient passed a uterine cast during the night. To the naked eye this appeared to be a typical decidual cast of the uterine cavity, such as would occur in association with tubal pregnancy of nine weeks' duration. It was triangular in shape and measured $2\frac{3}{4}$ in. in length and $1\frac{1}{2}$ in. at its widest part. It was nearly smooth and there was no evidence of any villous processes (fig. 1, p. 114).

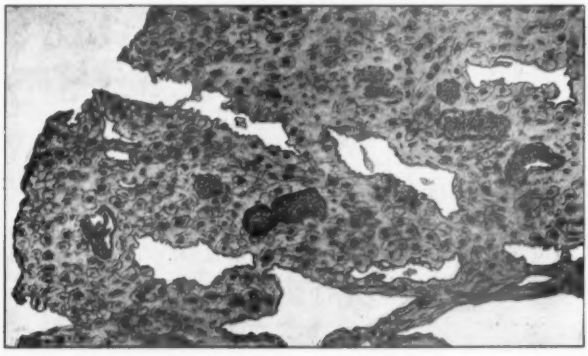
Microscopic examination confirmed the naked-eye appearance. The report, by Dr. W. McNaughtan, was as follows:—

"The bulk of the tissue consists of decidual cells, some showing early degenerative changes and a few cells are rather of fibroblastic type. Sections stained by van Gieson's method show a scanty matrix of fine fibrous tissue which in parts is decidedly œdematous. Vessels are numerous and thin walled, many being engorged with blood. There are no glands present but there are many irregular spaces without a definite lining; some contain blood, some have fibrin, but many have no contents. There is no evidence of chorionic villi nor of any chorionic tissue" (fig. 2).

Ectopic pregnancy was diagnosed and laparotomy was performed forthwith. At the operation there was no evidence of free blood in the peritoneal cavity, nor could any evidence of tubal or ectopic gestation be found. The right ovary contained a corpus luteum which occupied about one-sixth of the whole organ and from its size appeared to be associated with pregnancy. It was resected for microscopic investigation, with this possibility in view, and was histologically proved to be a corpus luteum. The abdomen was closed and the uterus was then explored. Two

small shreds of tissue were removed and nothing else was found. These were examined by the microscope and found to be similar in structure to the decidual cast.

FIG. 1.—Decidual cast (natural size). Specimen shrunk by hardening, preserved in Kaiserling solution.



[*E. G. R. Grant.*

FIG. 2.—Section of decidual cast. (Low power.)

Thus this patient had nine weeks' amenorrhœa followed by bleeding and intermittent attacks of pain and passed a typical decidual cast, yet no evidence of ectopic gestation could be found when laparotomy was performed.

The diagnosis therefore cannot be made with certainty, but in my opinion, it is most probable that tubal pregnancy had occurred in the ampulla of the Fallopian tube, that the ovum was aborted from the end of the tube into the abdominal cavity without much hæmorrhage, that the tube then contracted down and resumed its normal appearance, and that the ovum and blood were disintegrated or absorbed before laparotomy was performed.

In support of this is the fact that tubal abortion is the commonest termination of tubal pregnancy, though it is generally associated with more internal hæmorrhage than could have occurred in this case; further, that the decidual cast is typical in size, external appearance, and microscopic findings of that passed in association with ectopic gestation.

Another possible diagnosis is that this decidual cast is a very early abortion and might contain an early ovum, but the period of amenorrhœa—nine weeks—is too long to admit of this possibility.

Another hypothesis is that intra-uterine pregnancy occurred, that abortion took place and that this was followed by the passage of the decidual cast, but the bleeding had been slight and no tissue had been seen so it seems impossible that a nine weeks' abortion could have taken place.

I am therefore confirmed in my opinion that ectopic gestation must have occurred.

I am reporting this case because it is unique in my experience and I have not been able to find any similar case in the literature except one which is reported by Teacher.[1]

In this case a doctor's wife passed a decidual membrane about 1½ in. long by 1 in. wide. Her husband, suspecting tubal pregnancy, made preparations for operation. The pathologist, however, noted that a small portion of the decidua at one cornu was missing, and as there were no urgent symptoms, he advised expectant treatment. On the following day, a solid clot was passed which, on examination, was found to contain an ovum about the size of a pea.

This case, though showing similarity to the one reported, in that a decidual membrane was passed and tubal pregnancy was suspected, does not show any other similar points, for the period of amenorrhœa was much shorter, the decidual cast was much smaller, and no attacks of pain were noted.

Discussion.—Mr. CLIFFORD WHITE said that Mr. Luker's case was one of great interest and the interpretation was extremely difficult. It seemed improbable that a tubal mole resulting from a pregnancy of at least six weeks' duration could be aborted from the fimbriated end of the tube without leaving recognizable and definite signs in the peritoneal cavity, as the tubal mole took time to absorb. Apparently Mr. Luker had seen no signs of the mole or peri-tubal hæmatocele.

An alternative explanation might be that the case was one in which the ovum was implanted in the region of the internal os uteri, and had been expelled without the patient noticing it, leaving the decidua over the rest of the uterus intact. This decidua might then come away as a complete cast, resembling the cast of an extra-uterine gestation in every way. The very full and perfect decidual reaction of the cells in the section from Mr. Luker's specimen rather supported this suggestion.

Dr. J. S. FAIRBAIRN said that, although in entire agreement with the measures adopted, he was not convinced by Mr. Luker's interpretation of the findings. The tube recovered rapidly after harbouring a gestation, but the blood and products of gestation took much longer to disappear. As exploration of the pelvis showed no evidence of an occurrence of this kind a recent tubal gestation was, in his opinion, very unlikely. The early death of a uterine embryo, its maceration and the escape of the gestation-sac unnoticed by the patient, followed later by the passage of the decidua, seemed to him the more likely explanation.

1 Teacher, J. H., "Obstetrical and gynæcological pathology," London, 1935, p. 84.

The Merits and Demerits of Oxytocic Drugs in the Post-partum Period

By CHASSAR MOIR, F.R.C.S.Ed.

THE subject which I wish to bring to your attention is the action of various oxytocic substances on the post-partum uterus. Much of the experimental work on which this paper is based has been presented elsewhere, and to-night I intend to approach the subject from a different point of view and endeavour to assess the relative values of the various drugs in common use. It necessarily follows that much of what I have to say is an expression of personal opinion, and I quite expect that some of the statements will be severely criticized. Indeed, I hope that this will be so, for it is only by first setting forth various opinions that definite decisions can eventually be reached.

In order to restrict the discussion to reasonable limits, the use of drugs in the post-partum period only will be considered, and for the present purpose this period will be taken as meaning the time from delivery to the end of the usual twelve or fourteen days during which the patient is confined to her room. Oxytocic substances are administered during this period for three reasons: (1) To prevent possible occurrence of uterine hæmorrhage, (2) to check uterine hæmorrhage which has already set in, and (3) to promote involution of the uterus. In order to begin at once with an interesting topic, the last-mentioned therapeutic object will be taken first.

Involution of the Uterus

Involution of the uterus, simple as it seems, is in reality a most complicated process. Not only does this apply to the repair of the placental site and of the endometrium, but also more particularly to the means by which the bulk of the myometrium is diminished after parturition. The nature of the degenerative changes in the individual muscle fibres is not clearly understood, but it is evident that an intense destructive activity is present. Muscle fibres which, under the influence of œstrin and other hormonal and mechanical stimuli, have gradually increased in size during the nine gestational months, suddenly atrophy, with the result that, in a few weeks, the uterus shrinks to a twentieth or a twenty-fifth of its original size. It has been said by Whitridge Williams that this change "when compared with changes occurring in acute yellow atrophy of the liver, may well be designated as 'atrophia acutissima.'" Evidence of the intense destructive process is seen in the urinary nitrogen output which, according to the same authority, increases 30 to 50% after the first two or three days of the puerperium and gradually returns to normal when the uterus disappears into the pelvic cavity.

These physiological facts are mentioned in order to focus attention on the essential nature of uterine involution. The process is an active and vital one, and is more than a mere disuse atrophy such as is associated with, say, a broken limb. This brings me now to the point which I wish to emphasize. Uterine involution is too often lightly regarded as being a mechanical process, and by loose reasoning, "a nice hard uterus" becomes the essential feature of good involution. In furtherance of this idea, spasm-producing drugs are freely administered, perhaps on the analogy that as a soft hide subjected to tannin will be converted into useful hard leather, so will a uterus subjected to ergot be induced to shrink into the small firm condition of the non-pregnant organ. Now, to cause contraction or spasm is clearly not a way to aid a process of atrophy and involution of a muscle; moreover, since in the case of the uterus each muscle contraction means a temporarily lessened blood supply, it follows that when spasm is induced the net result must be a compression of the uterine sinuses and a general interference with the free blood supply of the organ—and this at a time when rapid changes are taking place in the myometrium,

necessitating free removal of katabolic products. Such a policy appears to be fundamentally unsound in the case of the normal uterus, and especially so in the case of the infected organ; yet, as we all know, it is for the septic uterus that oxytocic drugs are most freely given. *A septic finger is put at rest; too often a septic uterus is whipped into action.* (This is a subject on which some interesting comments were made by Dr. Hesketh Roberts [1] a year or two ago.)

Speaking for myself, I see no reason why nature should be interfered with during the puerperium. The normal uterus is quite able to look after itself and, left to itself, will contract vigorously at regular intervals. Such contractions ensure that the cavity is kept free of blood-clot, and it is quite possible that these powerful, isolated contractions are superior, in their ability to expel débris, to the prolonged spasm so sought-after by some obstetricians. If in a particular case there is evidence of retained lochia it is, of course, desirable to stimulate the uterus, but to this end it would seem better to give spaced doses of a preparation with a vigorous and comparatively brief action rather than to attempt to bring about a sustained uterine spasm.

So much for theory. Is there any direct evidence that involution is aided by drugs? So far as I know there is none. It will be remembered that some years ago Bourne and Burn [2] described an experiment in which two groups of puerperal patients were dosed with ergot extracts, and a third group was dosed with an inert solution made to resemble liquid extract of ergot. Involution of the uterus was measured daily but no significant difference was found between the three groups—if anything, the control patients showed the quicker involution. More recently DerBrucke [3] has given details of somewhat similar experiments. In this case the patients were given ergot preparations during the first three days of the puerperium. Judging by the published graphs there was again no significant difference between the various groups. Some years ago it was the custom in the obstetric department of University College Hospital to leave administrations of ergot to the discretion of the ward sisters, and in some wards liquid extract of ergot was given to each patient thrice daily during the puerperium. This indiscriminate use of the drug was stopped; the nurses were saved much work; the patients were saved much inconvenience and nausea, the hospital was saved £50 a year and, as far as could be seen, the uteri involuted just as they had done before.

Puerperal Gangrene

At this point it is convenient to consider the subject of ergot poisoning. Misuse of ergot may lead to gangrene of the extremities. It is true that this danger is remote and should never appear with reasonable dosage but, unfortunately, ergot is sometimes given unreasonably. For example, it has happened that a patient suffering from puerperal sepsis has been ordered large doses of a potent ergot alkaloid as, for example, ergotamine in the form of femergin (gynergen) tablets. Days go by, the patient makes slow progress, and after the lapse of weeks it is found that a conscientious nursing-staff is still giving thrice daily doses of ergotamine for the good reason that no one has remembered to counter-order the administration of the drug. In this way patients have received relatively enormous amounts of the alkaloid, and in some instances peripheral gangrene has developed. A large literature—chiefly German—has accumulated on the subject of puerperal gangrene. McNalley [4] has collected reports of 17 recent cases of which 12 were stated to have received ergot or ergot derivatives. Würth [5] has recorded a further example. In one case it appears that no less than 174 mgm. of ergotamine tartrate were given in twenty-five days.

It is, however, difficult to be quite certain of the part played by the alkaloid in the production of gangrene, for the condition is sometimes seen quite apart from the administration of ergot—usually in patients suffering from puerperal sepsis.

Dr. Benson of Edinburgh City Hospital, in a private communication, has kindly supplied me with details of 10 cases of puerperal gangrene. Nine of these patients had received doses of ergotamine tartrate, the total quantity administered ranging from 7 to 30 mgm., but in a tenth case no ergot in any form had been given, yet similar gangrene appeared. Further cases have been recorded by Wormser [6], Stein [7] and others. Perusal of this literature shows that the question is not settled, but one is left with the uneasy feeling that a strong suspicion is attached to administration of ergotamine or ergotoxine as one of the causal factors in the production of puerperal gangrene. Surely it is better to err on the side of safety and discourage prolonged administration of these highly potent drugs.

Methods of Recording Uterine Activity

Before discussing the other uses of uterine stimulants it is necessary to say something of the means by which uterine activity may be measured and recorded during the puerperium [8]. There are two simple ways of doing this; one is by an adaptation of Bourne and Burn's well-known method [2]. A small bag containing, when fully distended, about 12 c.c. of water, is mounted on a thin rubber tube strengthened by an internal stylette. The whole is sterilized by boiling and, with full aseptic and antiseptic precautions, is passed gently into the uterine cavity. The bag is connected by water-filled tubing to a recording manometer which traces on a slowly revolving drum the variations of intra-uterine pressure. From the sixth to the eighth day of the puerperium has been found to be most suitable for the work and, in an experience of nearly 200 such investigations, I have no evidence that this procedure, carried out with gentleness and care, is a source of danger to the patient.

The second apparatus is designed to record changes in the shape of the uterus which can be felt through the abdominal walls, and is a simplified form of an instrument described by Dodek [9] in 1932. This apparatus has the great merit of simplicity, and causes no discomfort to the patient; moreover it can be used in the early puerperium when it would be rash to introduce a foreign body into the uterus for fear of provoking sepsis. The recordings made by this instrument are a little erratic, and the amplitude of the recorded contractions varies with the stoutness of the abdominal wall and other factors; nevertheless, with increasing experience I have now come to use this method to the exclusion of the other except for those experiments in which an accurate record of intra-uterine tension is required. In what follows, the tracings to be shown of uterine contractions in the first three days of the puerperium were made with the external apparatus, and the tracings during the later puerperium were made with the intra-uterine bag.

With these methods of studying uterine activity it is now possible to obtain accurate information concerning the behaviour of that organ in the post-partum period, and especially of its response to drugs.

Normal Uterine Activity

The smooth muscle tissue of the uterus, like that of other hollow organs, shows a considerable amount of spontaneous activity. After expulsion of the placenta it contracts strongly and at regular, frequent intervals; this is admirably shown in tracings made by the abdominal apparatus. Incidentally, such tracings are most useful in teaching students and nurses some of the principles on which to conduct normal labour. Too often one finds that it is assumed that when the placenta is expelled, the uterus should become "nice and hard" and steadfastly remain in that firm condition. This belief is, of course, erroneous, and leads to an unnecessary amount of what the late Professor Whitridge Williams was pleased to call "bedevilling of the uterus"—both in the form of unnecessary kneading and squeezing, and also in the form of needless administration of drugs. It is not for a moment denied

that the uterus may sometimes relax to a dangerous degree, but abnormal flabbiness is a different matter from a regularly recurring relaxation alternating with contraction, and it is just this point which the tracings serve to illustrate.

To begin with, the contractions occur every five minutes or so; but soon they slow down to half this rate. In the later puerperium the contractions, as recorded by the intra-uterine bag, are of medium strength, and usually come at regular intervals of about fifteen minutes. In some cases the uterus will remain inert for three-quarters of an hour or more and then show a moderate activity for a short period; very occasionally the uterus may contract quite erratically both in time and force. An interesting response is sometimes seen as the result of suckling. Quite a decided uterine activity may be induced which will persist for fifteen minutes or so after the baby is taken from the breast. Thus we have an interesting confirmation of the well-known experience that after-pains are often induced by suckling (fig. 1); the mechanism of this sympathetic action is quite unknown.

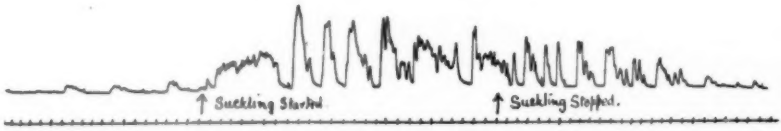


*FIG. 1.—Tracing made at end of first week of puerperium by the intra-uterine bag method, showing effect of suckling. Time is marked in minutes.

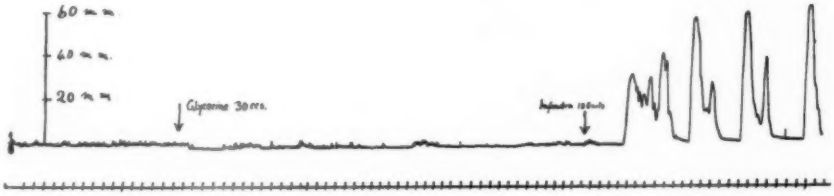


*FIG. 2.—Tracing made at end of first week of puerperium by the intra-uterine bag method. Intra-uterine injection of 30 c.c. of glycerine: later injection of 10 units of pituitary extract. Time is marked in minutes.

The actions of one or two of the less important drugs will now be briefly mentioned as a preliminary to the major consideration of the action of ergot and of pituitary extracts.

Glycerine

For some years intra-uterine injection of glycerine has been freely used for the treatment of uterine sepsis, in the belief that it promotes a free flow of lymph and also in the hope that it will stimulate the uterus to contract and to expel blood-clot and débris from its interior. To test this latter possibility a fine catheter was attached to the recording bag and introduced into the body of the uterus. After a preliminary recording, 30 c.c. of glycerine were slowly injected through the catheter. In one case some very feeble contractions were seen, and in three other cases the result was quite negative. A later injection of pituitary extract in one case provoked a brisk response, showing that the uterus was quite capable of strong action if suitably stimulated (fig. 2). It must, therefore, be concluded that intra-uterine injection of glycerine is at least an unreliable method of promoting uterine contraction.

*Reproduced by permission from the *Edinburgh Medical Journal*.

Gravitol[1]

"Gravitol" is the proprietary name given to a synthetic substance sponsored by a large manufacturing firm and claimed by them to have an ergot-like action on the uterus and to be a desirable alternative to that drug. Given in the recommended dose of one ampoule (1 c.c. of 1% solution) by intramuscular injection, this substance was found to have a definite but relatively feeble effect for a period of about twenty minutes. Injection of twice the recommended dose had a more decided action (fig. 3), but this was still far short of the response which can be obtained by administration of other better-known oxytocic substances.

Histamine

Histamine (called by one firm of manufacturing chemists by the trade-name of "ergamine") has a curious position in obstetric practice. For long it has been known that histamine is one of the many active chemical substances present in crude ergot, and, for this reason, it was perhaps natural to suppose that it might be used to reinforce the action of the purified alkaloids. Moreover, since those alkaloids were known to be slow to take effect, there was a hope that the quick-acting histamine would bridge over the gap between the administration of the drug and the onset of the alkaloidal action. Such preparations have been made, and are widely

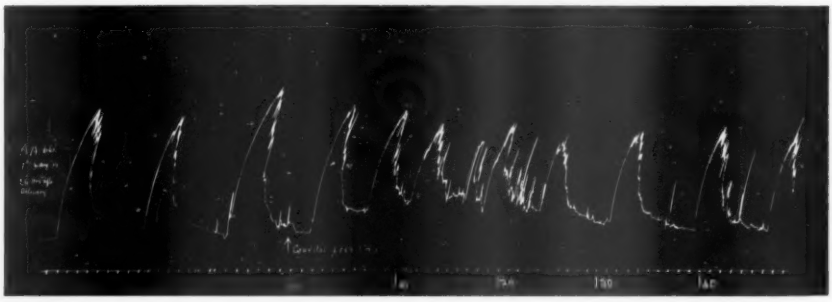


FIG. 3.—Twenty-four hours after delivery. "Gravitol" 2 c.c. injected intramuscularly. Time is marked in minutes. (Tracing made with external apparatus.)

used both for injection and for administration by mouth. It may be said at once that the inclusion of histamine in a preparation intended for oral administration can have no useful purpose, since no uterine activity can be detected even if large doses are administered in this manner. When given by injection the matter is more complicated. Histamine has a pronounced general action, producing marked blushing, headache and palpitation. It also has a prompt effect on the uterus causing fairly strong contractions which may last for twenty minutes or so. The question to be answered is whether a dose can be found which is large enough on the one hand to produce a useful uterine effect, and small enough on the other, to avoid an unpleasant general effect. Some confusion in clinical literature has come about by the substance being spoken of sometimes in terms of a salt and sometimes in terms of a pure base, and in any account of the action of histamine, the dosage must be very clearly defined. The acid phosphate is the form in which the substance is usually administered, and this weighs roughly three times as much as the pure base. Bourne and Burn [2] have reported that a dose equivalent to at least 1 mgm. of the base is required to produce a definite effect on the parturient uterus. I have corroborated this finding in the case of the puerperal uterus and can add that the

[1] Gravitol = diethyl-amino-ethyl-ether of 2-methoxy-6-allyl-phenol.

equivalent of 2 mgm. or more is required to produce a useful action. Regarding the side effects, it has been my experience that a dose equivalent to 2 mgm. of the base will always cause unpleasant symptoms, and even half this dose will sometimes upset a patient for a short period. It is thus impossible to give a dose large enough to be therapeutically useful without also producing undesirable side effects. When it is further remembered that histamine produces symptoms very similar to those of surgical shock, it will be realized that this substance is unsuited for administration in obstetrical emergency when the patient is already suffering from shock and blood loss. Fortunately, in the various preparations for clinical use, the dose of the drug appears to be reduced to very small measure. I would, however, suggest that the use of histamine in obstetric practice is an example of the type of mistake which is prone to occur when the precise needs of the clinician are not clearly visualized by the pharmacologist.

Ergot Alkaloids: The Ergotoxine-ergotamine Group

In 1906, Barger and Carr, working in this country, isolated an active alkaloid "ergotoxine." This substance was for many years neglected by clinicians, perhaps because it lacked the backing of efficient publicity such as has been accorded to some later discoveries. In 1918, Stoll, in Switzerland, isolated an almost identical alkaloid, "ergotamine," which, under the trade names of "femergin" and "gynergen," is now freely used by obstetricians the world over. Recently, Wolf, in Hungary, has isolated another alkaloid named "sensibamine"; and still more recently the Küssner in Germany, has obtained from ergot yet another alkaloid

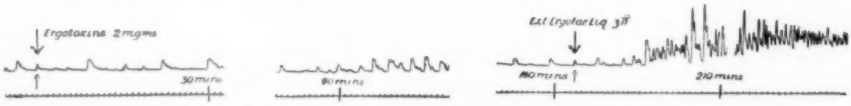


*Fig. 4.—Tracing made at end of first week of puerperium by the intra-uterine bag method. Ergotoxine ethanesulphonate, 2 mgm. was given by mouth with little or no effect. Three hours later Ext. Ergotæ Liq. (B. P. 1914) 3ij was given by mouth with brisk uterine response in 13 minutes.

named "ergoclavine." Now, fortunately for us, matters are not nearly so complicated as might be imagined from this list. The alkaloids mentioned—ergotoxine, ergotamine, sensibamine, and ergoclavine—make a well-defined group with regard to their clinical action and, indeed, all observations to date go to show that in this respect they are indistinguishable from each other.

These alkaloids have very large molecules and, perhaps because of this, are slow to take effect when administered in permissible dosage. Thus, when given by mouth no effect is seen in graphic recordings of uterine action until at least thirty-five minutes have elapsed, and usually a very much longer time is required; in some cases no effect has been detected over a period of two hours. Contractions, when they do set in, are small and erratic, and spasm of the uterus is not seen (fig. 4). In fairness, however, it must be stated that it is probable that repeated oral administration may lead to a prolonged heightened irritability of the uterus; whether or not this is a desirable state of affairs is a moot point, and I have already indicated my views on the matter.

Administration of members of the ergotoxine-ergotamine group by intramuscular injection is a more satisfactory procedure. After a lapse of about twenty minutes strong uterine contractions gradually set in which soon merge to produce a fairly well-marked uterine spasm. This spasm is evidenced by a rise in the base-line of the tracings, and lasts for about an hour and a half, after which the intra-uterine tension returns to normal. Regular, strong, isolated contractions now take the place

*Reproduced by permission from the *British Medical Journal*.

of the spasm and continue for some hours (fig. 5). The exact duration of this second stage cannot be accurately determined because of the limitations of time set on clinical experiments. In some cases, however, it is known that an augmented uterine action has still been present four hours after the administration of the drug.

I wish to emphasize certain points concerning the exact nature of the action of ergotoxine, for this is a matter which occasioned some controversy. It has long been known that ergot produces uterine spasm, and it has been too quickly assumed by some that this spasm is caused almost exclusively by the ergotoxine content of the drug. It will later be shown that this is not the case. Nor is the degree of spasm so great as has sometimes been supposed, for, in fact, it is no greater than can be obtained by use of other oxytocic substances, and its duration after permissible dosage is seldom more than one and a half hours.

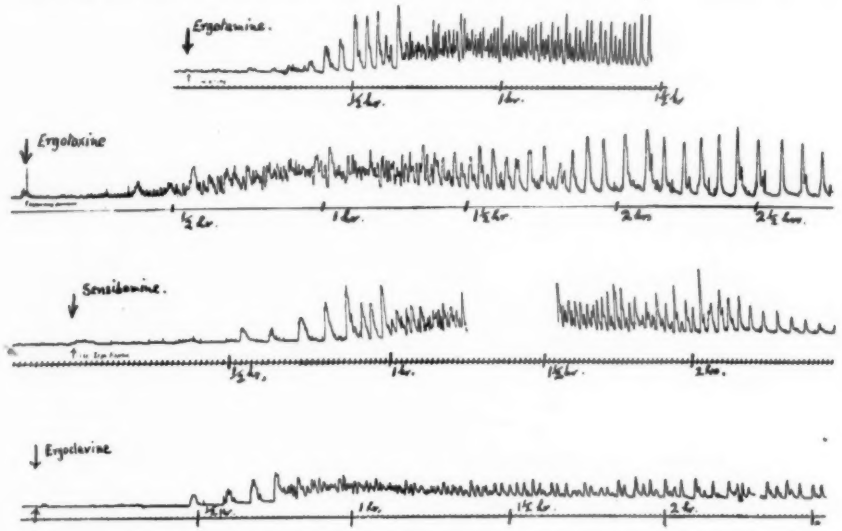


FIG. 5.—Tracings made at end of first week of puerperium by the intra-uterine bag method, showing effects of ergotamine tartrate, ergotoxine ethanesulphonate, sensibamine, and ergoclavine, in doses of 0·5 mgm. by intramuscular injection.

This last statement, in particular, is contrary to current belief, and requires explanation. So far as I have been able to discover, the only clinical evidence in support of a long-standing uterine spasm following the use of this class of drug is described in Bourne and Burn's work [2]. This evidence, however, concerns one case only and one which was, in certain respects, abnormal. One milligram of ergotamine tartrate was given intramuscularly (i.e. twice the usual maximum clinical dose) to a patient *during* labour. An intra-uterine bag indicated a state of spasm for three hours, after which the recording was discontinued; obstetrical difficulties arose, and finally a retained placenta had to be manually removed. On account of the clinical features of this case, the observers judged that spasm was still present after at least sixteen hours. Now, important as these findings are, I venture to suggest that clinical impressions concerning a single case in which an unusually large amount of the drug was given cannot, by themselves, be accepted as sufficient evidence on which to make a definite pronouncement concerning the clinical action of the drug. Later investigations, repeated many times over, have shown that, in

the puerperal uterus at least, spasm does not last longer than about an hour and a half after ½ mgm. of ergotoxine or ergotamine given intramuscularly.

The New Alkaloid: Ergometrine.

So much for the ergotoxine-ergotamine group of alkaloids. Quite recently Dr. H. W. Dudley [11], of the National Institute for Medical Research at Hampstead, has isolated another alkaloid to which the name of "ergometrine" has been given. I have Dr. Dudley's permission to say that its formula appears to be $C_{19}H_{23}O_2N_3$ (ergotoxine = $C_{35}H_{41}O_6N_5$). In several respects this new alkaloid stands in strong contrast to those already considered, and its clinical and pharmacological properties show that it must be placed in a class by itself. Clinically, it is remarkable for rapidity of action which distinguishes it from the ergotoxine-ergotamine group. By mouth an effect is usually seen in five to eight minutes, by intramuscular injection in three to four and a half minutes, and by intravenous injection in about one minute. When given by any of these methods the onset of action is abrupt, and there is well-marked uterine spasm brought about by the partial coalescence of a series of

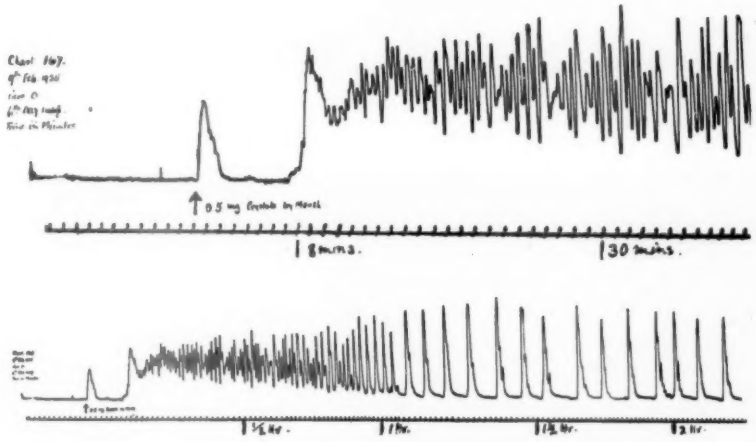


FIG. 6.—Sixth day of puerperium: Ergometrine 0·5 mgm. by mouth. (Tracing made with intra-uterine bag.)

rapid contractions. This stage lasts for about an hour, after which isolated strong contractions occur at regular intervals and continue for one and a half to three hours or more, although for reasons already stated it is difficult to get exact information on this point. It is possible that this stage is not so long as the corresponding stage seen after administration of one of the ergotoxine-ergotamine group (fig. 6).

The magnitude and the duration of the ergometrine action are, of course, dependent upon dosage and, in the description given, an average dose has been considered. Ergometrine is now on the market in tablet and ampoule form in quantities representing the minimal useful clinical dose. It should, however, be realized that when a powerful effect is required in the shortest possible time—as, for example, in cases of post-partum hæmorrhage—a larger dose should be employed. The following probably represent what should generally be used in such cases: by mouth, 1 mgm.; by intramuscular injection, 0·5 mgm.; by intravenous injection,

0·125 mgm. (figs. 7 and 8). It may be said, however, that these doses have been increased to as much as 1·5 mgm., 0·75 mgm., and 0·15 mgm. respectively, without symptoms of intolerance appearing. One can thus say with certainty that ergometrine is freer from unpleasant side effects than members of the ergotoxine-ergotamine group, all of which in ordinary clinical dosage not infrequently produce symptoms of depression, headache and nausea. I am also permitted by Sir Henry Dale and Dr.

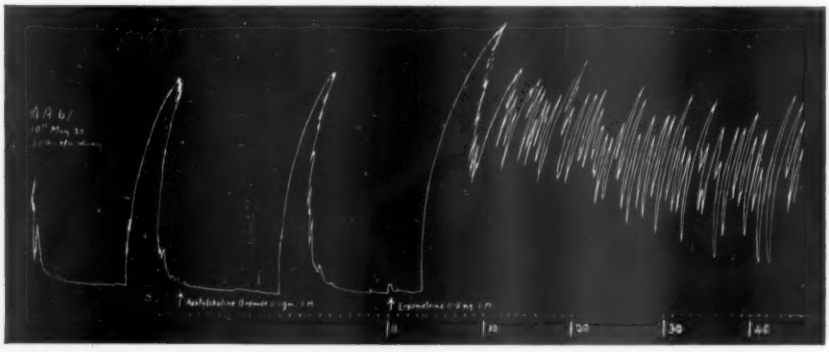


FIG. 7.—Twenty hours after delivery. Acetylcholine bromide 0·1 grm. injected intramuscularly—no effect. Ergometrine 0·5 mgm. injected intramuscularly—pronounced effect in 3½ minutes. Time is marked in minutes. (Tracing made with external apparatus.)

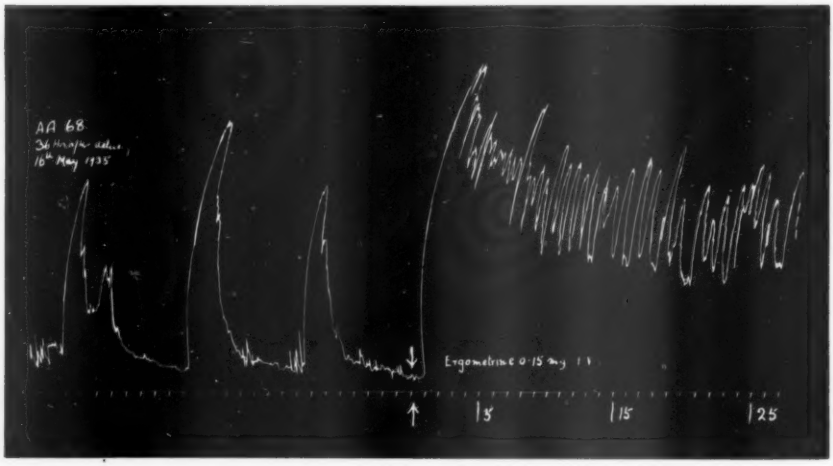


FIG. 8.—Thirty-six hours after delivery: Ergometrine 0·15 mgm. injected intravenously. Time is marked in minutes. (Tracing made with external apparatus.)

G. L. Brown to state that their investigations of the pharmacology of ergometrine have indicated that this drug is also free from dangerous gangrene-producing properties: in test experiments only a temporary cyanosis of the cock's comb can be obtained.

There is no doubt that ergometrine is the constituent to which aqueous extracts of ergot owe their activity [12], and it accounts for the clinical action of the B.P. 1914 ext. ergotæ liq. about which there was at one time so much discussion

(fig. 4). It is also certain that it was the ergometrine action of crude ergot which led to that substance being introduced into midwifery practice some three hundred years ago as a means of accelerating parturition.

In 1813 the following account of the action of ergot decoction was given by Prescott [13]:—

"The pains produced by it when a full dose is given, are very peculiarly forcing, and the contractile effort of the uterus continues to that degree, that the fœtus is not suffered to retreat, but remains firmly retained where the last exacerbation of the pain left it, until it recurs again. The incessant action will continue if delivery is not effected, for an hour or more, and when it subsides, the medicine, again given, will produce the same effects. The frequency and violence of the uterine effects induced by ergot, are not more extraordinary than its almost instantaneous operation."

Prescott then goes on to give instances of its action appearing in from seven to fifteen minutes of administration of the dose.

This description of the clinical action of the old-fashioned decoction has a faithful counterpart in fig. 6, which depicts the action now known to be characteristic of the purified chemical principle ergometrine. The tracing also clearly indicates the marked spasm which during labour is so dangerous, and which led to the "pulvis ad *partum*" of the earlier writers being renamed the "pulvis ad *mortem*."

Clinical Use of the Ergot Alkaloids

A comparison of the clinical values of the various ergot alkaloids may now be made. The ergotoxine-ergotamine group is distinctly inferior to ergometrine in rapidity of action, but when the action does set in the former alkaloids, *if given by injection*, produce a spasm of rather longer duration than does ergometrine, the difference being one of about 50%. The total duration of effect is also probably longer in the case of the ergotoxine-ergotamine group. In fairness to ergometrine, however, it must be pointed out that the precise duration of action is not a matter of first-class importance, for if, in some particular case, it is deemed advisable to keep up a long effect, it is a very simple matter to repeat the administration of ergometrine by giving an oral dose either in the form of the pure alkaloid or in the form of an ergot extract of known potency. Keeping these facts in mind, it seems fair to say that in ergometrine we possess a drug which unites the useful clinical properties of the ergotoxine-ergotamine group with other valuable characteristics which these latter alkaloids lack.

The advantages of the quick-acting ergometrine in the treatment of post-partum hæmorrhage are obvious; more will be said of this later. Meantime it is convenient to discuss the prophylaxis of post-partum hæmorrhage.

When labour is over many obstetricians are in the habit of giving a dose of ergot extract, or an injection of an ergot alkaloid. It is supposed that by doing this the patient can be left alone—overnight perhaps—without fear of uterine bleeding recurring. This procedure, commendable though it is when applied to cases presenting signs of uterine atony, is of questionable value when used as a blind routine. The normal uterus is quite able to look after itself and I have never been able to bring myself to believe that we improve on nature by whipping-up the post-partum organ and causing it to increase its work a hundredfold or more. Further, let us be quite honest in the matter; do we really believe that a single dose of ergot given at the time of delivery will be effective over a period of twelve hours or more? It would seem that such a practice is like locking the stable-door between the hours of, say, 6 and 10 in the evening in order to prevent the horse escaping next morning at 8 o'clock. Would it not be more reasonable to leave a dose of ergot extract or an ergometrine tablet with the patient, instructing her to swallow the medicine in a draught of water should any free bleeding occur? By this means we should be sure of a maximum effect with uterine spasm within a few minutes of the onset of bleeding. In fact, however, such recurrent bleeding is very rare when the placenta has been

expelled normally, and it is seldom that the emergency dose will be used. It may forestall criticism to say now that there is no evidence that routine administration of ergot after parturition is harmful, but the point to be emphasized is that this practice provokes an intense immediate activity without giving a guarantee of later protection from hæmorrhage; moreover, it makes for a state of affairs far removed from the normal physiological behaviour of the uterus.

Third-stage Hæmorrhage

A brief digression will now be made in order to touch on the subject of third-stage hæmorrhage, although, strictly speaking, this is outside to-night's discussion. Uterine hæmorrhage, while the placenta is still in situ is at least equal in clinical importance to post-partum hæmorrhage. Usually it can be controlled by simple means which need not be discussed now. I wish, however, to suggest that in resistant cases the use of ergometrine is worthy of consideration. This suggestion is made with some hesitation for it is fully realized that, theoretically at least, the drug might cause uterine spasm with retained placenta; but in a desperate case in which hæmorrhage must be controlled at all costs, the risk is worth taking, and for this purpose a full dose of ergometrine, such as 0·5 mgm. by intramuscular injection, or better, 0·125 mgm. by intravenous injection should be given. I have not yet had an opportunity of dealing with severe third-stage hæmorrhage by this means, but I have records of 21 normal cases in which 0·25 or 0·5 mgm. of ergometrine has been injected immediately after the birth of the child. In each case the placenta separated in the course of five to ten minutes and was easily expelled from the vagina.[1] Judging from these records the danger of retained placenta cannot be very great. If it should occur it would probably be best to leave the uterus alone for two hours, if possible, in order that the main effect of the drug should be spent before a Credé expulsion or a manual removal of the placenta is attempted.

I hope that I will not be misquoted in this matter. I do not advocate the routine use of ergometrine in the third stage of labour, or suggest that it should displace the simpler methods of controlling hæmorrhage, but I do say that it is worthy of trial if these methods have failed, and especially if the uterine muscle is found to be in a relaxed condition.

Posterior Pituitary Extract

The final matter for consideration is the use of posterior pituitary extract, familiarly known by the trade names of "pituitrin," "infundin," &c. In some ways it is more difficult to make a definite pronouncement regarding the clinical value of this substance than of the previously described drugs. Pituitary extract has, as we all know, a most remarkable effect on the uterus, and, for obstetric work, the action is in some ways superior to that of all other oxytocic substances; nevertheless it also has unfavourable characteristics, and these, too, must be taken into consideration before assessing the relative value of the drug.

Pituitary extract exercises its greatest effect on the uterus at term. It has much less effect during pregnancy, and Robson [14] has shown that in the early weeks of gestation it is without action on the isolated human uterine muscle. I have obtained some evidence that the magnitude of the pituitary effect also quickly lessens when parturition is over; after the first week the uterine response is sometimes insignificant, although the exact effect varies greatly from patient to patient. The precise action at this late stage is, however, of little consequence, since the use of pituitary extract is usually restricted to the immediate post-partum period.

The rapidity of onset of uterine action after intramuscular injection is very great. It is quite usual for an effect to appear after only two and a half minutes have elapsed. It is sometimes said that pituitary extract produces no spasm but only augments the normal uterine contractions. This is true of small doses only.

[1] In one case the placenta soon separated and appeared at the vulva but required fairly strong fundal pressure to complete its delivery.

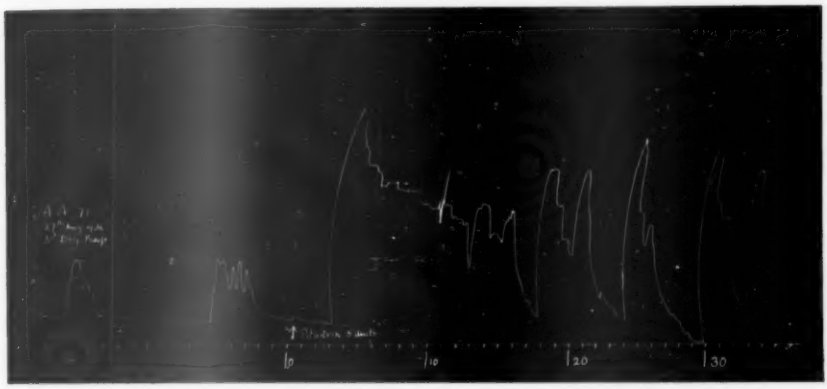


FIG. 9.—Third day of puerperium: Pituitrin, 5 units injected intramuscularly. Time is marked in minutes. (Tracing made with external apparatus.)

The usual 5-10 unit dose causes a well-marked spasm for five to ten minutes, after which the uterine contractions are considerably increased in magnitude, and slightly increased in frequency. The total duration of the effect is usually from half to three-quarters of an hour (fig. 9). In these respects pituitary extract differs considerably from the ergot alkaloids.

SUMMARY OF ACTION OF DRUGS

Drug	Time of onset in minutes: By mouth	Time of onset in minutes: Intramuscular	Time of onset in minutes: Intravenous	Duration of spasm	Total duration of action	Side effects	Other disadvantages
Ergotoxine, Ergotamine, Sensibamine, Ergoclavine	Unsatisfactory	20	6	1½ hrs	? 4 hrs. +	Depression, headache and nausea often produced	Gangrene after prolonged administration
Ergometrine	7	3½	1	1 hr.	? 3 hrs. +	None seen	—
Pituitary extract	—	2½	—	8 mins.	¾ hr.	Rarely "pituitary shock." ? Constriction of coronary vessels	Erratic action

The disadvantages must now be considered. Pituitary extract must be standardized by biological test and its dosage expressed in terms of arbitrary units instead of directly in terms of weight as in the case of chemically pure substances. Patients react in a very varying manner to the drug, and it has been one's clinical experience that pituitary extract is sometimes—although rarely—quite ineffective. Lack of action is not due to "bad" extract, for other injections from the same batch of ampoules, or even from the same bottle, have been found to be fully potent; the variable factor seems to lie in the patient herself. One case will be mentioned. A women whose labour pains ceased after the birth of the first of twins, was given 5-unit doses of pituitary extract at half-hourly intervals. No effect of any kind was seen, nor did labour pains recommence until several hours had elapsed.

Another, and much graver, disadvantage of pituitary extract is that it brings about constriction of the coronary arteries, and physiologists tell us that under certain circumstances its administration will lessen the cardiac output. If this holds true for clinical work—and there is some reason to believe that it does—then the extract is certainly a double-edged weapon to use in cases of obstetric shock. I have had experience of one case bearing on this point. A patient already severely shocked after operative delivery, was given 10 units of pituitary extract. In a short time the general condition deteriorated; a further dose of 10 units was given; again

the patient's condition changed for the worse, and she died half an hour later. It is, of course, impossible to say from this one case whether the aggravation of the shock was the result of the pituitary administration or merely a coincidence, but since that time I have always made a point of using the purified oxytocic principle, pitocin, in preference to the ordinary extract, in cases of obstetric shock. Pitocin is a pituitary preparation largely freed from the pressor principle to which the undesirable qualities have been ascribed.

Post-partum Hæmorrhage

Pituitary extract has long been the sheet-anchor in the treatment of post-partum hæmorrhage, and rightly so, for its rapid and intense action is well suited to this condition. Hitherto it has been the only standardized substance available for producing a quick action in this emergency, but with the introduction of ergometrine it now has a serious rival. True, ergometrine does not act so quickly when given by intramuscular injection—three or four minutes are required instead of two and a half minutes in the case of pituitary extract—but ergometrine is well suited for intravenous injection and, given by this route, a uterine response appears in about one minute. Ergometrine also seems to be uniformly reliable and consistent in its action. As yet it is too soon to make a definite pronouncement regarding its usefulness in cases of hæmorrhage and shock, but already one such case has been treated with the drug. After intramuscular injection of 0·5 mgm. satisfactory uterine contractions were observed, and the pulse, which had previously been imperceptible, soon became quite countable at the wrist. Obstetrical shock is therefore no contra-indication to the use of ergometrine, as it is to the use of ordinary pituitary extract.

From a consideration of these various matters it is justifiable to say that ergometrine is likely to prove a valuable alternative to pituitary extract in the treatment of post-partum hæmorrhage, and in this and other respects, to be a most useful addition to the obstetrical armamentarium.

I must express my thanks to Professor F. J. Browne, for facilities given in the Obstetric Unit of University College Hospital for carrying out the experimental work on which this paper is based, and to Professor James Young, of the British Post-Graduate Medical School, in whose department part of the work is being continued; also to a loyal nursing-staff, in both institutions, whose help has been invaluable.

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Professor J. H. Burn said that he found himself in agreement with very nearly everything that Mr. Chassar Moir had said. There was no doubt that the routine administration of ergotoxine or ergotamine in the puerperium was a bad thing, as it certainly produced depression and headache. He wondered, however, whether the arguments put forward did not indicate that ergot and its alkaloids had no longer any place in obstetrics at all, since pituitary extract could exert the same kind of effect, and as a normal constituent of the body, should be less harmful. He was very glad to see the evidence that ergometrine produced an effect lasting up to three hours, for the earlier tracings which Mr. Chassar Moir had published indicated an action of much shorter duration, and he accepted the criticism that the evidence for the long duration of the action of ergotamine rested on only one case.

Section of Odontology

President—Frank Coleman, M.C., L.R.C.P., M.R.C.S., L.D.S.E.

[*January* 28, 1935]

Life-Masks in Conjunction with Models of the Mouth

By R. A. Broderick, D.S.O., M.B., L.D.S.E.

The purpose of constructing life-masks in conjunction with models of the mouth is to permit the surgeon, in such cases as those of hare-lip and cleft palate, to study the results of his operations at each separate stage and to compare the condition of the patient at the beginning of treatment and at the end. A complete series of these would be invaluable for teaching purposes, as it is very rare that a student gets the opportunity of seeing the treatment of a complicated hare-lip and cleft palate carried through to finality.

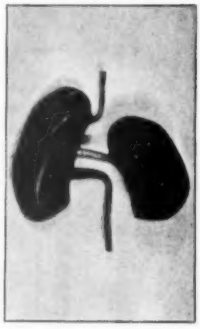


Fig. 1.

A model in plaster gives a much better idea of the position of hard and soft parts than any photograph or drawing can possibly hope to convey.

The materials used in the obtaining of models and masks are pink modelling wax, ordinary composition, vulcanite splints, and plaster of Paris. Composition is used in preference to other materials because it is easy to work and sets quickly, a very important point when dealing with infants. After the masks and models are poured, a certain amount of building up and free-hand carving may be necessary to correct the imperfections of impressions.

The technique is as follows: Any cleft in the palate is lightly packed with gauze to prevent the composition from mushrooming. An impression is now taken with a suitably sized tray and a model cast therefrom (fig. 1). To this model a vulcanite splint is made which covers the hard parts only, the two sides being joined by a platinoid wire. In addition, another platinoid wire is run from the vulcanite into the position of the cleft. This splint is now tried in the mouth. The sulci of the cheeks are corrected, if necessary, with composition. Modelling wax is now softened and placed into the position of the cleft and held there by the platinoid wire. With the splint and wax placed in the mouth, the wax is finger-moulded so as to obtain an accurate impression of the sides of the cleft and, if possible, of the turbinates and

septum as far back as the soft palate and split uvula. This may have to be tried-in and adjusted several times before accuracy is obtained. The vulcanite splint and wax model combined are now cast in plaster. This gives an accurate model of the inside of the mouth. An impression must also be taken of the lower jaw in the usual way. The upper vulcanite splint is then boiled free of wax and two or three platinoid wires vulcanized to the front part of it, sufficiently wide to clear the lips

FIG. 2.

FIG. 3.

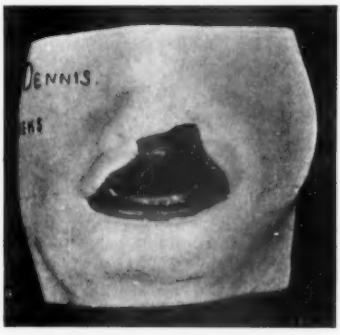


FIG. 4.—Life-mask, front view.

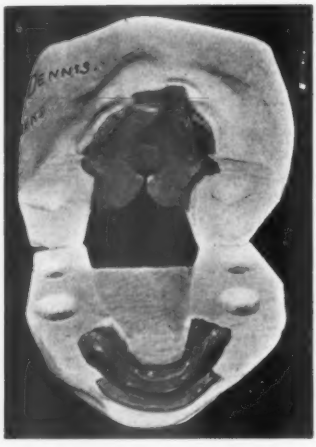


FIG. 5.—Internal view of mouth.

(figs. 2 and 3); similarly, platinoid wires are fixed in a vulcanite plate made to the lower jaw. At this stage it is wise to prepare firm base plates for the taking of the bite. This method of finger-moulding wax has been described by Harold Round (*International Dental Federation Congress. Paris*, 1931, Section xii, 76).

The upper splint is now placed in the mouth and a large mass of composition is attached to the three protruding wires which should be bent to conform roughly with the contour of the upper lip and nose. The soft composition is moulded to these while the splint is held in the mouth. When set, the whole is removed as one piece. The lower jaw is treated in a similar way and the bite taken with the base-plates. The two

models, upper and lower, then have their bases trimmed to allow the splints and mask-impression to be adapted. The models should be soaked and holes bored into the bases. With the splints in position plaster is poured into the mask-impressions and this will adhere to the models of the mouth. When the splints and mask-impressions are removed with hot water the two models are put together into their respective positions with the help of the bite-plates. It will be found in practice that the bite is slightly open, owing to the thickness of the bite-plates preventing the gum pads touching as they do in infancy.

FIG. 6.—Life-mask, front view.

FIG. 7.—Internal view of mouth.

It will probably be found necessary to build up or adjust the model at the angles of the mouth and some carving may be required at the alæ of the nose and in the region of the soft palate. When all this has been done the model may be dried, stearined and painted (figs. 4, 5, 6, 7).

Although this work sounds complicated, it is in reality easier than it appears. Provided one has good assistants and skilled mechanical help, the procedure of making these life mask-models amply repays any time expended on them. Recently I have been using old gramophone records, softened in hot water and pressed into the models in place of vulcanite splints. I find that these are prepared much more quickly and they have proved perfectly satisfactory.

Pathological Specimen and Skiagrams of a Horse's Mandible showing Actinomycosis

By C. BOWDLER HENRY, L.R.C.P., M.R.C.S., L.D.S.E.

THIS dry specimen from an adult horse exhibits the typical appearance of actinomycosis with prolific bone formation in a localized mass on the outer, inner, and under aspects of the right mandible. The new bone presents the characteristic worm-eaten structure (figs. 1 to 5) and, as shown in the skiagrams, involves the whole thickness of the jaw. Unfortunately there is no clinical history, but the

FIG. 1.

FIG. 2.

FIG. 3.

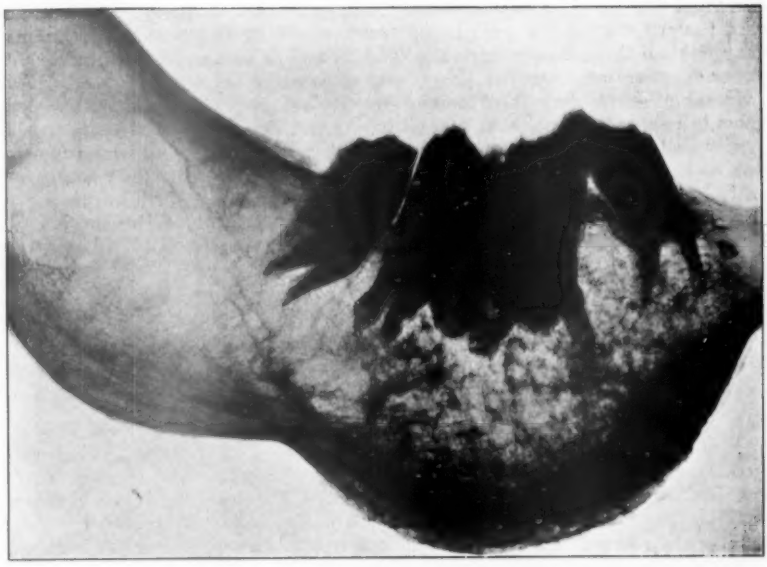


FIG. 4.

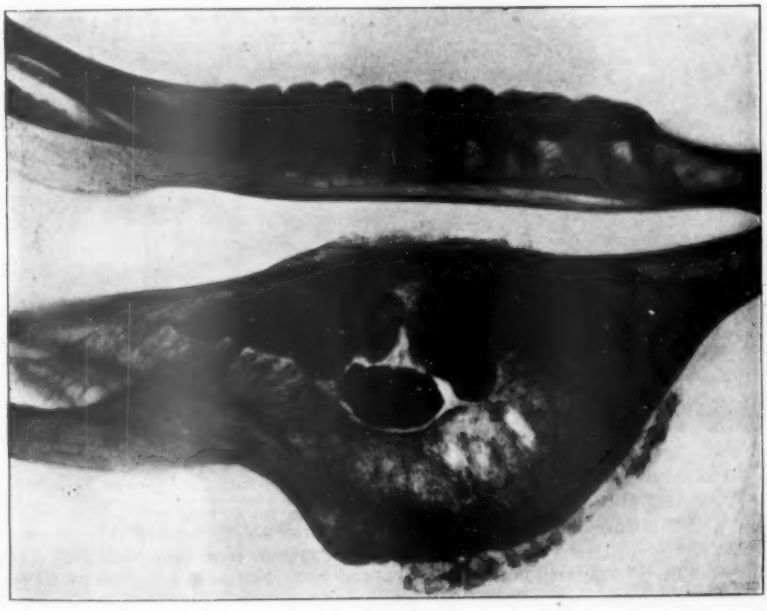


FIG. 5.

crowding and irregular disposition of the teeth on this side suggest that the infection preceded the eruption of the permanent teeth, which upon casual inspection appear to be larger than those on the normal side and one less in number.

Closer examination, however, shows that the enlargement of the teeth is due to a considerable extra deposit of cementum around each one, the enamel-dentine components being of normal size. The teeth over the centre of the mass are loose and easily fall either out of the jaw or into the large cavity which occupies the interior of the lump. There appears to be a space for the missing tooth, which evidently has dropped out.

[I am indebted to Mr. John Hammond, M.A., for the loan of the specimen from the School of Agriculture, Cambridge University, and to Drs. Coldwell and Allchin for the skiagrams.]

Pathological Changes in the Jaws of Animals

By Robert Bradlaw, L.R.C.P., M.R.C.S., L.D.S.E.

None of the skulls shown here has any recorded history, and all that we may learn concerning them is from the examination of the specimens themselves. The interest lies not only in the pathological changes, but in the realization that man has no monopoly of the commonly found oral diseases. The skull of the pine marten (*see* fig. 7), for example, presents a by no means unfamiliar orthodontic

Fig. 1.—Channel of entry.

problem, and the tiger and one of the canine specimens show two of the end-results of trauma of a different type. Modern civilization has been indicted as an ætiological factor in pyorrhœa. The advanced periodontoclasia in one of the two skulls of the domestic dogs shown here gives support to this view.

I have to thank the Museum Committee of the Royal Dental Hospital for

permission to show these specimens, and Sir Frank Colyer for his kindness in helping me to describe them.

The first specimen is that of the mandible of a fully grown tiger, which has been shattered by a bullet, with subsequent necrosis of a large area of bone and some new bone formation.

The projectile entered the right jaw behind the ascending ramus and then impinged against the body of the mandible of the opposite side. The groove cut out by the path of the bullet is clearly seen in fig. 1.

Mr. Churchill, the gun expert, is of the opinion that the bullet was a ·303 solid projectile of the military type, as a soft-nosed bullet would have shattered the bone at the point of entry. In this case the velocity of the bullet was only impeded until the impact occurred at the left jaw.

FIG. 2.—Effect of impact and subsequent necrosis.

The necrosis and subsequent new bone formation that followed show (fig. 2) that the animal survived the injury which, in view of its proximity to important vessels, is in itself remarkable.

The second specimen (fig. 3) is the skull of a domestic dog with advanced periodontal disease. This condition is commoner in the short-muzzled than in the long-muzzled types. Sir Frank Colyer regards the frequency of the disease in domestic animals as compared with those in the wild state as an indication that the altered nature of the diet is an important factor in the causation of the disease.

It will be seen that the condition is extremely well marked in this specimen, and that the upper jaw is more affected than the lower. There has been a periodontal abscess of the left upper carnassial with complete denudation of the anterior root. Whether this is because the disease spreads more rapidly where the force of mastication is greatest, or whether it is because the texture of bone in this area is less dense can only be surmised. An interesting fact is that there is evidence of active caries in the lower right second molar, so that here caries appears to be coexistent with pyorrhœa. There is also marked attrition of the molars, with secondary dentine formation, but this, of course, is a not unusual feature.

The third specimen (fig. 4), the maxilla of *Canis familiaris*, presents the unusual feature of symmetrical abscess formation in connexion with the upper carnassial tooth on both sides of the jaw. There is a sinus formation opening on the buccal and palatal aspects of the jaw.

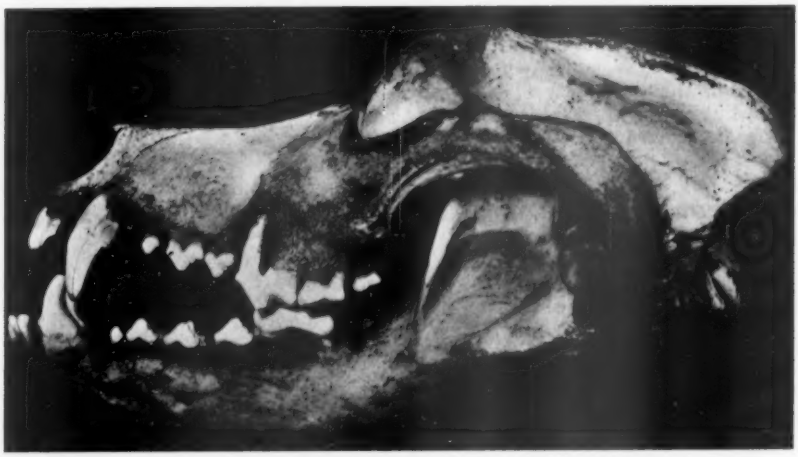


FIG. 3.—Denudation of root of the upper carnassials in chronic periodontal disease of dog.

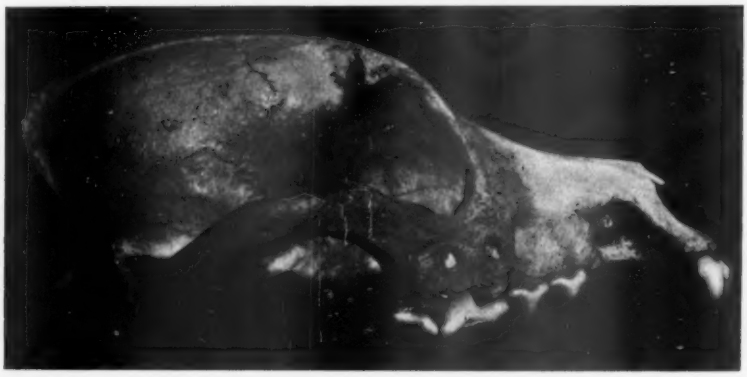


FIG. 4.—Dog with abscessed upper carnassials sinus on buccal aspect.

It would not be unreasonable to assume that this condition was the result of trauma, some stick or stone inflicting the injury, and thus accounting for the symmetrical condition.

It must be noted, however, that the upper right canine is also abscessed and that the sinus has passed from this to the nasal cavity itself. The rest of the alveolus, although it shows some interstitial absorption, is comparatively healthy.

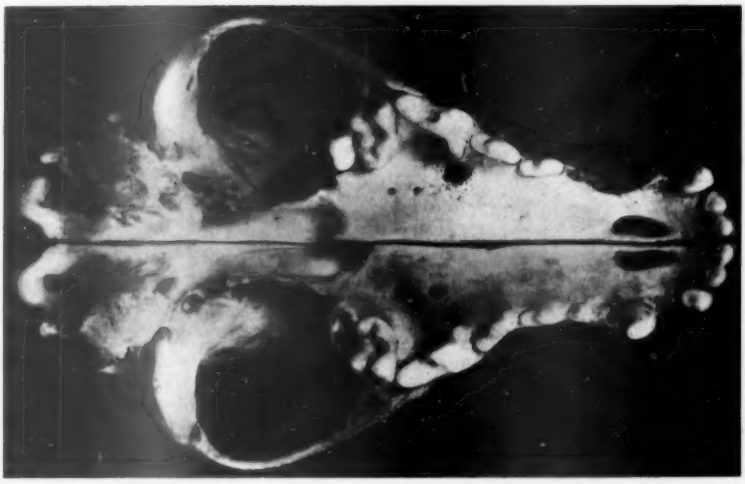


FIG. 5.—Dog with abscessed upper carnassials sinus on palatine aspect.

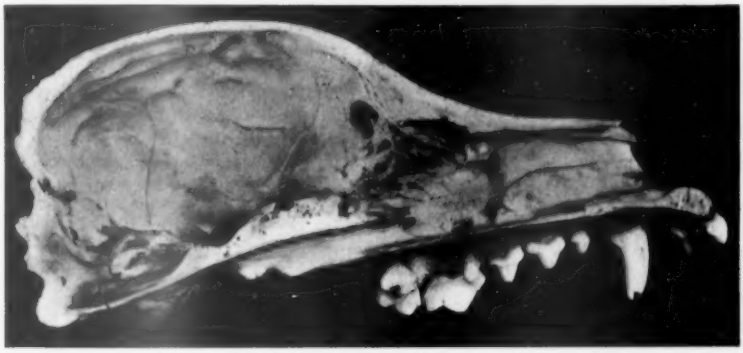


FIG. 6.—Sinus from upper canine opening on nasal fossa.

The last specimen is the skull of a pine marten. This animal, once common in this country, is extensively distributed throughout modern Europe and Asia. Despite its name it shows no special preference for pine trees. Its body, in the adult specimen, is about 18 in. long, its tail 9 to 12 in. and its fur a rich dark brown.

This specimen does not conform to the usual dental formula

$$I\,\frac{3}{3}\,C\,\frac{1}{1}\,P\,\frac{4}{4}\,M\,\frac{1}{2}$$

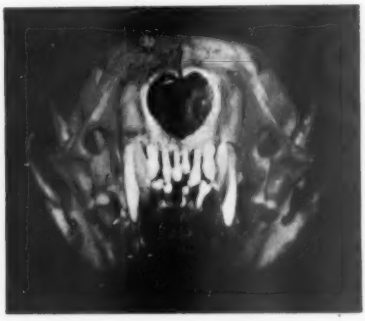


FIG. 7.—Pine marten.

as there are two additional lower incisors. There is a possibility, however, that these are retained deciduous teeth although they have not this appearance.

Another feature is the impaction of the left upper central and crowding of the incisors, so that we may reasonably assume that this condition is not always the result of evolutionary change.

Osteitis Fibrosa of Maxilla and Cranium

BY GEORGE T. HANKEY L.R.C.P., M.R.C.S., L.D.S.E.

THE patient, M. B., is a married woman with three children. She was aged 43 when first seen in my out-patient department at the London Hospital on 16.7.31.

History.—No previous illnesses of importance. Recently in poor general health with loss of weight. Nine years before she had had an upper left molar tooth extracted. Following this there was a gradual painless and diffuse enlargement of the left side of the maxilla, which eventually spread to the right side. She presented herself for extraction of the remaining teeth, which were tender and loose.

On examination.—The following teeth were standing—

$$\text{R.}\ \frac{87\quad 3\ 1\ |\ 123}{4321\ |\ 12345\quad 8}\ \text{L.}$$

They were all loose and tender on percussion, owing to chronic alveolar and periodontal infection. The whole maxilla was much enlarged, causing prominence of the upper lip and a generally broad appearance of the face.

Intra-oral skiagrams of the teeth and alveolus showed general decalcification of the bone, with periodontal infection. A "whirl" of dense bone was seen lying high above the upper left canine and was visible in all subsequent skiagrams. A skiagram of the skull showed that the pituitary fossa and cranial bones were normal.

Further history.—Extraction of all the remaining teeth was completed by 14.10.31. On 7.12.31 there was a sudden acute inflammatory swelling of the left side of the maxilla, including the palate. The patient had had severe headaches, loss of weight, and general debility for some time.

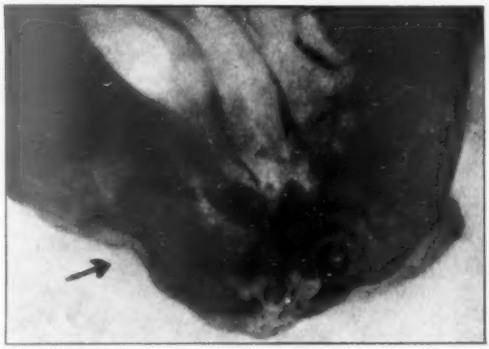
Treatment.—The swelling was incised, palatally and buccally, and pus was evacuated. The acute inflammation subsided with the use of hot fomentations and mouth-washes but a chronic discharge of pus remained.

An occlusal skiagram of the maxilla showed "general decalcification, with hypertrophy; the 'whirl' of dense bone can be seen towards the centre of the picture" (fig. 1).

The patient continued in ill-health, with severe headaches. On 11.2.32, under a general anæsthetic, I exposed the maxilla on the left side and removed a large amount of necrotic bone. There was no demarcation of the infection; the bone everywhere was soft and fibrous, and could be cut with a scalpel. The cavity was packed and kept open for drainage. It subsequently healed and epithelialized. Following the operation there was a rapid improvement in general health.

Pathological report.—"Osteitis fibrosa of maxilla. Well-differentiated fibrous tissue containing numerous trabeculæ of bone. Active apposition and osteoclastic resorption of bone. There are a very few small areas of leucocytic infiltration, but in general the infiltration is so slight that the fibrosis is not obviously due to infection."

History (continued).—I sent the patient to Dr. Donald Hunter for a general investigation on 7.4.32. The results were as follows: Medical examination—All systems normal. Special examinations—Red and white blood-cells normal.



7.12.31.

FIG. 1.—Occlusal view of maxilla.

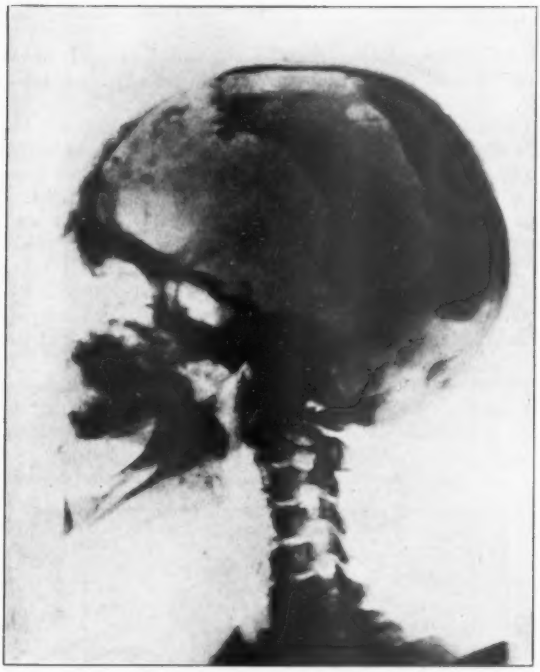
Wassermann reaction negative. Calcium and phosphorus metabolism normal. Skiagram of whole skeleton normal, except the head.

From this date there was a steady improvement in general health and no further enlargement of the maxilla. Slight discharge occurred from a small sinus in the palate on 22.2.34. A skiagram disclosed rarefaction of bone around the "whirl"; the sinus led up to this area. I again opened and curetted under a general anæsthetic, and the sinus eventually healed.

On 8.3.34 the nose was examined and revealed nothing abnormal.

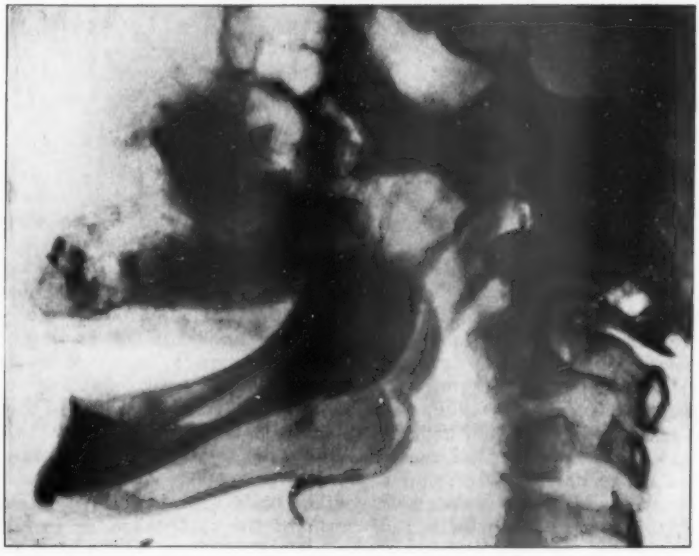
A skiagram of the whole skull, on 15.3.34, showed the progression of the disease in two years and eight months (fig. 2). The bones of the anterior half of the cranium are now decalcified and mottled, and the dense outline of the skull has gone. The mandible is not affected.

Full upper and lower dentures were fitted on 20.6.34, in spite of the size and shape of the upper jaw. A further skiagram of the skull taken on 14.1.35—nine months after fig. 2—does not show any appreciable progression of the disease.



15.3.34.

FIG. 2.—Lateral view of cranium.



14.1.35.

FIG. 3.—Enlarged lateral view of maxillæ.

Fig. 3 is an enlargement of the maxillary portion, showing the hypertrophy and loss of the normal anatomical details of the maxilla.

As far as can be ascertained, the total duration of the disease to date is 12 years —from the age of 34 to that of 46.

The patient, at present, seems to be in very good health, but it is unlikely that the condition will remain stationary; more probably it will slowly progress.

The cause was most likely a local pyogenic infection of the maxilla, which gained access through the molar tooth first mentioned or through its socket, and thence spread through the maxilla to the base of the skull and to the bones of the cranium.

[*April* 15, 1935]

Sequelæ following Injection Anæsthesia in the Mouth: A Bacteriological Investigation

By HAROLD ROUND, M.D.S., L.D.S., and H. J. R. KIRKPATRICK, M.B., B.Ch.

THE purpose of this paper is to draw attention again to some of those sequelæ which occasionally follow injection anæsthesia in the mouth for the purpose of the extraction of teeth. They vary very much as to their severity, sometimes only amounting to pain and swelling, or a subsequent neuralgia, but sloughing of the soft tissues, osteitis, necrosis, and even osteomyelitis may follow injection anæsthesia in the mouth. On one occasion when three separate injections were made, one in the lower incisor region and one in each upper bicuspid region, there appeared afterwards large chronic tuberculous ulcerations in each area.

This present investigation, dealing chiefly with infiltration anæsthesia, is due to the fact that we have been called upon more frequently during the last two or three years, to treat these serious conditions at hospital. In 1924, and again at a later date, bacteriological investigations were made by Round and Broderick (*British Dental Journal*, 1924, xlv, 27), to try to explain the reasons for their occurrence, and on each occasion the investigation seemed to prove an infection of the submucous tissue in the area of injection. The present investigations are largely based on the technique of that employed by Round and Broderick.

Whilst endeavouring to call attention to what must be considered of vital importance in the technique of injection anæsthesia in the mouth—namely the possibility of an infection of the submucous tissue in the area of injection—at the same time we try to aid the technique by offering suggestions for improvement in the methods of sterilization of the surface of the injection area.

The principal factors to be considered in a study of the causation of sepsis are three.

(1) Faulty technique, including inadequate sterilization of syringe, instruments, &c., and of the surface area into which the anæsthetic fluid is injected. It is clear that if micro-organisms are present on the surface of the tissues there is a risk of sepsis occurring as a result of organisms being carried into the tissues on the injection-needle or instruments.

(2) The presence in the depth of the tissues of micro-organisms which assume invasive characters as a result of:—

(*a*) Deprivation of the tissues of their blood supply, due to vaso-constriction caused by adrenalin in the anæsthetic fluid and from tension due to the injected fluid. It is assumed that, as a result of this, these tissues suffer from a lowered vitality and resistance, and are therefore less able to resist infection.

(*b*) The devitalization of the tissues resulting from surgical trauma and from tension arising as a result of the injection.

(3) The invasion of devitalized tissues by micro-organisms from the surface, following surgical procedures.

The scope of the investigation which we are carrying out is indicated by the above considerations, but in this paper we shall confine ourselves to two aspects of the problem, namely :—

(1) Asepsis as regards the area into which the anæsthetic fluid is injected, and

(2) The possible presence of micro-organisms in the submucous and deeper tissues.

In the experiment recorded we used unselected cases. Some of the patients had relatively healthy mouths, others had definitely septic mouths. Most of the patients were extraction cases, though some of them required the surgical removal of papillomata, or other surgical procedures.

In our earlier experiments we were impressed by the frequency with which bacterial growth was obtained in cultures prepared from swabs taken of the sterilized surface-area of injection. We carried out experiments to determine whether this was due to implantation on the sterilized area of bacteria from adjacent structures, or to failure of the iodine solution used to sterilize the injection area effectively. We were able to demonstrate that the contaminating organisms probably came from the adjacent tissues. We therefore planned experiments and evolved a technique which would give us information on two points :—

(1) As to any improvement in asepsis to be gained by protecting the injection area from bacterial contamination in the interval between sterilizing the area and injecting the anæsthetic fluid.

(2) As to whether micro-organisms are present in the depth of the tissues.

Bacteriological technique.—Only organisms which grow under aerobic conditions on blood-agar or in hormone broth medium were studied.

(1) The injection syringe and needle were sterilized by boiling and the rubber cap of the bottle containing the injection fluid was sterilized by immersion in spirit. (2) The injection area was swabbed and the swab immediately rubbed over the surface of blood-agar. The injection fluid was then drawn up into the syringe and two inoculations into broth were carried out to control the sterility of the needle and injection fluid. (3) The syringe needle was immersed in a tube of broth-medium, and (4) a few drops of injection fluid injected into a second tube of broth-medium. (5) The syringe needle was now held inside the patient's mouth for one minute and then immersed in a third tube of broth-medium. This culture controlled infection of the needle by droplet contamination from the patient's mouth, for a period equivalent to the average time required to carry out an injection. The syringe and needle were now placed in a tray containing spirit until required for giving the injection. (6) The injection area was sterilized with a $2\frac{1}{2}\%$ solution of iodine in spirit and a swab of the sterilized area was taken. This swab was inoculated in a fourth tube of broth. (7) The injection was then made, and immediately afterwards the needle was immersed in a fifth tube of broth.

The blood-agar plate receiving the inoculum from the first swab was incubated for twenty-four hours and the type of growth recorded. All broth cultures were incubated for at least three days before being discarded as negative. The type of growth present in a positive broth-culture was determined by plating out on a suitable medium and supplying appropriate tests for the identification of the organisms present.

In a bacteriological investigation in which inoculations are made of material which may contain substances having bactericidal properties as well as bacteria, it is important that fluid medium be used, so that by adequate dilution the possibility of inhibition of bacterial growth is obviated. For this reason a solid medium was used for the first swab only, and all tubes of broth contained a volume of not less than 20 c.c.

The flora present on the unsterilized tissues.—The organisms most commonly grown from the first swab were *Streptococcus viridans*, *Streptococcus hæmolyticus*, *Micrococcus pharyngis flavus*, *Staphylococcus aureus* and *albus*, and the pneumococcus. Of these organisms, *S. viridans* was always present, and in the majority of cases was the most numerous organism grown in culture. Hæmolytic streptococci were frequently present and were grown in considerable numbers in many of the cases. *M. pharyngis flavus* was present in the cultures from all cases. Staphylococci and pneumococci were comparatively rarely grown.

Asepsis technique.—In the first group of 25 cases the injection area was sterilized with iodine solution and no special precautions were taken subsequently to protect the area from adjacent structures. This, we felt, was perhaps the commonest technique carried out in ordinary practice.

In a second group of 34 cases, the injection-area, after sterilization, was protected from contact with adjacent structures by pads of sterile gauze wrung out in iodine solution.

Now this is important: organisms were grown from the injection area after sterilization: (*a*) in 20% of the first group of cases; (*b*) in 6·6% of the second group.

In most cases the positive culture was pure *Streptococcus viridans*; in one or two cases there was a mixed culture of *Streptococcus viridans* and other types. That special protection of the sterilized injection area from bacterial contamination is necessary in any satisfactory asepsis technique is indicated by the marked improvement in asepsis in our second series of cases. The fact that organisms were grown from the second swab in a small percentage of cases of the second group is probably to be attributed to allowing the antiseptic to act for too short a time. In our experiments we allowed the antiseptic to act for one minute. With the particular antiseptic employed by us in this investigation it is probable that the antiseptic should be allowed to act for at least one and a half minutes to ensure complete asepsis in every case, but that it is questionable whether all cases would tolerate a spirituous solution of iodine, owing to irritation, although most of our cases showed little discomfort in this way.

The presence of organisms in the depth of the tissues.—We want to make this clear: any experiment in which there was evidence of contamination from any source due to faulty technique was discarded from this series of cases. In the experiments recorded the bacteriological results can be classified into two kinds:—

(*a*) That in which there was growth in the culture of the first swab and in no other culture after at least three days' incubation. This was interpreted as a negative result.

(*b*) That in which there was growth in the first and last cultures only within a period of three days' incubation. This was recorded as a positive result.

When a positive result was obtained the broth culture was plated out and the organisms identified by suitable bacteriological tests.

Thirty experiments are included in this series. Positive cultures were obtained from the depth of the tissues in eight cases or 26·6%. An analysis of the types of organism grown in the positive cases gives:—

Two cases: a pure growth of *Staphylococcus aureus*.

Five cases: a pure growth of *Streptococcus viridans*.

One case: *Streptococcus viridans* and *Micrococcus pharyngis flavus*.

In all the positive cases, organisms of the same type were present as part of the flora of the surface tissues, except in the two cases from which *S. aureus* was grown. *S. aureus* was not recognized as forming part of the surface flora in either of these cases.

Controls.—Control experiments in this series were carried out on six healthy young adults. The results were all negative.

Mandibular nerve-block anæsthesia.—This method of inducing anæsthesia was employed in four cases. The results were all negative.

As we think this investigation has proved the presence of organisms in the submucous tissue we shall continue it further :—

(1) We shall include in it 100 or more cases.

If the present ratio between "contaminated cases" and "non-contaminated" positive cases remains the same, and if we can reduce the percentage of "contaminated" cases, we shall feel sure of the significance of our data.

(2) Different kinds of antiseptics will be tried, including aqueous solution of iodine and hydrogen peroxide.

(3) We shall arrange for every patient examined to report on the day following treatment, and perhaps at subsequent intervals, when the technique will be followed out again in order to gain information on two points :—

(*a*) As to whether invasion of devitalized tissue commonly occurs after extraction following injection anæsthesia.

(*b*) As to the significance of different types of organisms in the causation of "clinical" infection. In the present series of cases the only one showing clinical infection gave a positive result with *Staphylococcus aureus* at the time of extraction. Since all the other positive results gave a culture of *Streptococcus viridans* from the needle, what is the significance of this organism in dental sepsis ?

Section of Epidemiology and State Medicine

President—J. D. ROLLESTON, M.D.

[*March* 23, 1935]

A New Approach to the Epidemiology of Tuberculosis

By EVELYN M. HOLMES, M.B., Ch.B.

SINCE the first discovery of the tubercle bacillus workers have been busily engaged all over the world in trying to improve the diagnosis of tuberculous infection by laboratory procedures. The literature relating to the examination of sputum alone is immense and such names as Calmette, Griffith, Petroff, Löwenstein, Lange, Riemsdijk, Jensen and Mozar, are familiar to all who have studied the progress of tuberculosis through the years. I have myself visited the continents of America and Europe in the hope of obtaining help and guidance in this work, but I have not seen anywhere more striking results than those obtained in the State Serum Institute of Denmark, in Copenhagen. An entire department is given over to tuberculosis, with, at its head, Dr. K. A. Jensen, who had built-up, on the techniques of Löwenstein and Griffith, a method of his own for the discovery of tuberculosis in sputum, pus, and body-fluid, and for the cultivation of the bacillus and its differentiation into human and bovine types. Many thousands of specimens are dealt with yearly, and in the well-kept books upon the laboratory table is a wealth of information for anyone who cares to see. The type of culture I found obtained is well illustrated by photographs (fig. 1) of some of Jensen's own cultures from sputum and stomach-wash water. The outstanding features of the medium employed appear to be the displacement of peptone by asparagin, the use of malachite green, and the almost entire exclusion of glycerine (less than $\frac{2}{3}$%). The medium, as used by Jensen, has been described in English in the *Journal of State Medicine* for October 1934[1] and also appears in Mackie and McCartney's "Bacteriology" 1934 edition, although in the latter a different technique is described for the preparation of materials for inoculation than that used by Jensen or advocated by me. I was so impressed by the diagnostic value of the work in Denmark that I came back to England in March 1933 to speak of it and in September of the same year accepted the invitation of Sir Frederick Menzies, County Medical Officer of Health for London, to work out the method in this country in the Southern Group Laboratory of the London County Council. From routine specimens which were being thrown away after having been reported on as "negative" by microscopic examination I obtained many a positive culture and in a little over three months, from these and other specimens sent specially for my

1 The proportion of magnesium sulphate was given in error in this paper as 0·4% instead of *0·04*%, a correction not appearing until a later issue.

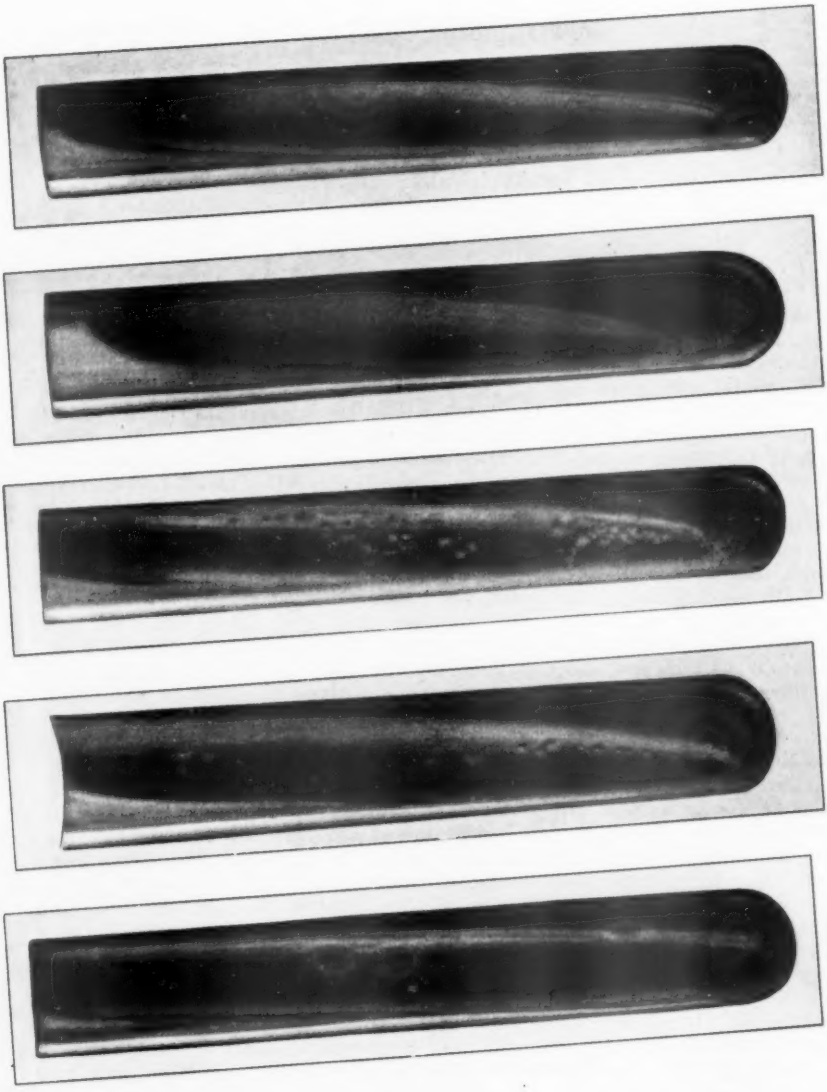


FIG. 1.—Cultures obtained by Dr. K. A. Jensen (Copenhagen).

investigation, almost all "negative" to the microscope, I had obtained the following cultures[1]:—

From sputum	119
„ pus	70
„ urine	15
„ cerebrospinal fluid ...	15
„ pleural fluid	21
Other sources	20
Totalling ...	260

I obtained these results easily and the growths were luxuriant. In place of the test tube I used, as advocated by McCartney, a screw-topped bottle and found that the medium was more easily and richly preserved by its means. I used 4% caustic soda as homogenizing agent and insisted on strict neutralization of the sediment and on the employment of a pipette technique in place of the platinum wire. The clearest and best results were obtained from specimens for which no treatment had been necessary and the medium had been inoculated direct from the specimen jar. Therefore, particularly, did it appear to me that a wider use of this method should be advocated for the clearing up of the diagnosis of doubtful cases and in order that as early as possible cases should come to the notice of the Officers of the Tuberculosis Service, treatment be instituted and homes be investigated for the source of infection or for other cases arising from the same source. The wide adoption of culture has, in my opinion, very great epidemiological importance and should be supported or encouraged in some manner by the State.[2]

The Microscopical Examination of Sputum

There is a further way in which the laboratory can help in the elucidation of problems of pulmonary tuberculosis and certain of their epidemiological aspects. When we send a sputum to a laboratory for a report it is usual to obtain the simple answer "positive" or "negative" according to whether tubercle bacilli have, or have not, been discovered in the specimen. Certain sanatoria and certain laboratories are accustomed to report in addition upon the degree of infection in a "positive" case. But many other features may be reported upon, and in the detailed findings in both "positive" and "negative" sputa a wealth of interest may be found. A sputum that is "negative" but contains areas of pus of a type suggestive of tuberculosis, should certainly be re-examined or further investigated, while the same applies to a sputum that is persistently mucopurulent and yet bacilli cannot be discovered within it. In the latter case it may be that the thick tenacious character of the sputum is making it both difficult to "spread" upon the slide and to "read" successfully. In still another type of "negative" sputum the detail is of great interest. If one finds fibres or elastic tissue then there is some destructive lesion going on in the chest. Actually the fibropurulent sputum of old "phthisics" is frequently "negative" and yet its individual characters are so striking that one may suspect tuberculosis from these appearances alone and a report of such should indicate not only the importance of X-raying the chest of the patient from whom the specimen was sent but the likelihood of secondary cases of infection in the same *milieu*. When we come to the consideration of the detail in "positive" cases many other features of interest, both clinical and epidemiological,

[1] Quoted from a paper read at the Norwich Congress of the Institute of Public Health and published in the *Journal of State Medicine*, 1934, xlii, 559.

[2] A number of actual cultures were then shown to illustrate the ease with which results could be obtained of great clinical and epidemiological value, both in regard to individual case-problems, and problems of a more general nature.

FIG. 1.—Cultures obtained by Dr. K. A. Jensen (Copenhagen).

are involved. Perhaps the best way to bring these questions before you will be to show a few illustrations of my own microscopic findings in the routine work of a sanatorium and to discuss the varying significance of the very different appearances which are met with :—

H1017, Mrs. A., 10.12.34.—Here we see, amongst thin pus, many tubercle bacilli, singly and in groups and clusters, of slightly varying length but mainly short : some are very short, others which are more of a medium length lie singly and are beaded practically throughout their length. (Plate : Fig. 1.) One knows at a glance, after clinical and microscopic correlation in many hundreds of such cases, that here is an instance of high resistance to tubercle : one may safely go forward with whatever measures the clinical or anatomical extent or type of disease indicate : and unless infection be too extensive, or the degree of infection too heavy, the chances of recovery are good : later films will show more beading and clumping of the bacilli and their final disappearance.

H1022, W. B., 12.12.34.—Here there is an entirely different picture. The sputum is thin and purulent. The bacilli are long, straggly, and lie singly or in loose groups. Here and there is a beaded form and some forms are a little shorter than others. (Plate : Fig. 2). This is a picture of poor resistance. Every month the sputum is the same and every month the clinical condition remains unchanged. There is no degeneration, no expulsion, of the bacilli, no effort is shown to overcome the infection. Pneumothorax has failed ; radiologically, anatomically he may seem a case for thoracoplasty but the sputum shows that he would be a very poor risk. On the sputum findings alone any major surgical interference should be vetoed : on the other hand I believe such a patient highly infectious to his surroundings. The bacilli in his sputum look very much " alive."[1]

H1125, R. R., 7.1.35.—The sputum is partially caseous. I am showing the film to demonstrate the differing lengths of bacilli which may occur in a single case. (Plate : Fig. 3.) Briefly they tell you the patient's story and the years of struggle may be read in the film as the years of life on a sawn log. Speaking in a general manner one may say that short bacilli are old, long bacilli are new : but long bacilli may remain so if there is poor resistance, as we saw in the last film, and short bacilli may reproduce themselves and multiply in a short form : but an appearance such as this film gives, indicates repeated relapse, and it is likely that the very long forms seen here are related to the extra effort made at Christmas time to take some share in the season's festivities. Had the patient remained longer in the sanatorium one might have seen the shortening and beading of these bacilli as strength was regained, as one has seen in others, but he left the sanatorium before another examination was made.

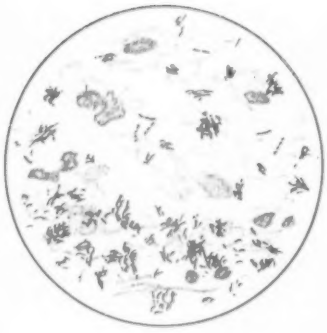
H1379, R. C., 6.3.35.—The patient had no sputum for a year and then unexpectedly produced some. A detailed examination showed very thin, but typical, tuberculous sputum and scanty bacilli. The bacilli were in semi-degenerate state and found singly or in very small degenerate clumps. (Plate : Fig. 4.) The usual simple laboratory report of " positive " might have left one in doubt as to the significance of the occurrence of such sputum but the report of detail indicated that the sputum was arising from an old focus : there was nothing to suggest extension.

[Many other films were shown by epidiascope to illustrate different points of interest in sputum detail and the bearing of these upon epidemiology.]

Monthly Examinations of Sputum

If one makes monthly examinations of sputum in a sanatorium, points of great interest in detail may be brought out, but also one may see in a striking manner the effects of different treatments and one may come to gauge in this way the mass value of one method as against another. Many patients lose the " positive " character of their sputum, or lose their sputum entirely, on purely sanatorium treatment, as this term is generally applied. Others lose their sputum with sanocrysin and this finding has been repeatedly commented upon. But with both

[1] Some recent cultural findings have tended to give support to this contention of the varying activity of " positive " cases in respect to the state of the bacilli in the sputum.



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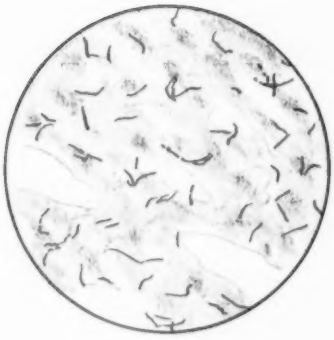

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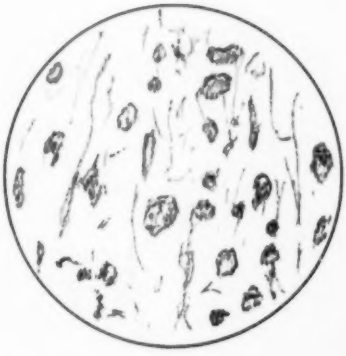

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The microscopic appearances of sputum (hand drawings). Ziehl-Neelsen stain, with methylene blue.

these methods a return of the sputum or of its positive character appears to follow rapidly any lapse in the treatment or in the continued care of the patient.

The following are examples :—

Mrs. H. (sanatorium alone).

++
+ (+)
+ (+)
+
+ (+)

" ÷ "

Mrs. M. O'N. (sanatorium and sanocrysin).

+++
+
÷ (after sanocrysin)
+ (+)
+
÷ (with continued sanatorium care)
+ (slight hæmoptysis)

Miss E. W. (sanocrysin)

+++
No sputum ÷ with sanocrysin
++
+ (+)
++ (+)
++

Miss M. G. (sanocrysin).

" Pos."
" Neg."
No sputum (1st course sanocrysin)
No sputum
+
÷ (2nd course sanocrysin)
+
+ (+)
÷ (3rd course sanocrysin)
+

In the last case (Miss M. G.) one sees the sputum clearing of bacilli three times, only to return after the termination of the course. But when one comes to look at the pneumothorax cases quite a different picture presents itself. The sputum clears more quickly, disappears, and does not recur if the collapse is maintained ; it does not become positive again with the return of sputum associated with a common cold or cough as does that of the non-surgically treated case. It may reappear or temporarily increase if further surgical intervention is called for to improve the collapse, as with a phrenic operation or adhesion cutting, as illustrated in the case of Mrs. M. S. (*see* below), but only to clear again with the completion of the collapse.

Miss F. S. (sanocrysin and then pneumothorax).

Positive
Negative (with sanocrysin)
Positive
+
+++ (with pneumothorax)
+++
+ (+)
(+)
÷

Miss L. B. sanocrysin and then pneumothorax

Positive
No sputum
Negative (with sanocrysin)
Positive
++
+ (+)
++
+
+ (pneumothorax induced)
+
No sputum
No sputum
No sputum

Miss E. L. (pneumothorax)

+ (+)
+ (artificial pneumothorax induced)
++
÷
No sputum
No sputum

Mrs. E. C. (pneumothorax)

++ (artificial pneumothorax induced)
++ (+)
++
No sputum
No sputum

Mrs. M. S. (pneumothorax and phrenic operation)

++++
++ (A.P. given)
+++
÷
+ (after phrenic operation)
No sputum
No sputum

The "in toto" figures taken from the female side of Wooley Sanatorium for 1934 show the value of pneumothorax in clearing up the "positive" character of sputum, both in the results of induced pneumothorax cases and in the proportion of cases which respond to this treatment:—

Artificial Pneumothorax,
Wooley Sanatorium, Northumberland:
Female Wards (76 Beds), 1934

During the course of the year there were 39 successful inductions in positive cases (36 patients).

At the close of the year 27 of the 36 patients had negative or no sputum.

Of 31 patients in the wards at the end of January 1935 with "negative" or no sputum, who had come in "positive," 26 had cleared on pneumothorax treatment, 3 on sanocrysin and 2 on sanatorium care alone.

Other Collapse Measures

One feels that this clearing-up of the infectivity of cases by collapse procedures is work of not only individual, but national, importance and that it should be encouraged and assisted by all those who have the epidemiology of tuberculosis at heart. Not only should there be better training of doctors for this work but there should be better facilities for carrying it out and for carrying out such further operative measures as come to be indicated in cases dealt with on the lines of collapse therapy. Very frequently the effect of a pneumothorax is seriously mitigated by the presence of adhesions holding out the lung to the chest wall. Matson has shown, from an experience of 249 of such cases, that division of these adhesions will convert 70% of unsatisfactory cases into satisfactory cases, and Maurer, with an experience of 800, has had a mortality-rate of less than ½%. When pneumothorax fails there are the small operations of phrenic evulsion, apicolysis, and partial thoracoplasty, which could and should be carried out in the sanatoria in order that the best possible conditions should be available for the patient and the close ties between patient and physician, which mean so much in this complaint, be not rudely broken. Even the major operation of complete thoracoplasty is now most usually performed in several, if not many, stages, and most conclusive evidence—which I have permission to quote—has recently reached us from the Continent in regard to the superior value of sanatorium care for these cases.

THE FIGURES OF Dr. ANDRÉ MAURER[1] (Paris and Passy)

Group A. 130 cases operated upon in a sanatoria

Good results	80%
Inadequate	10%
Deaths	10%

Group B. 102 cases operated upon in a city hospital

Good results	56%
Inadequate	17%
Deaths	26%

(The deaths include not only those of patients dying soon after operation but also those of patients who have died months or even years later.)

Before concluding I have a small number of lantern slides to show which illustrate the major points brought forward in this paper.

[1] Ref. G. A. Mason, *University of Durham College of Medicine Gazette*, Jan. 1935.

Miss F. S. Chest. (Fig. 2.) A large cavity remains patent in the left lung, despite prolonged pneumothorax treatment, and cauterization of adhesions is indicated. Every sanatorium dealing with cases of pneumothorax should have provision for this further care.

Mrs. O'N. Chest. (Fig. 3, p. 50.) There is a persistent cavity at the left apex. Pneumothorax failed. Response to general treatment has been excellent, but there is a little persistent sputum and she remains a danger to herself and her family. There should be sanatorium provision for apicolysis or upper thoracoplasty in a case like this.

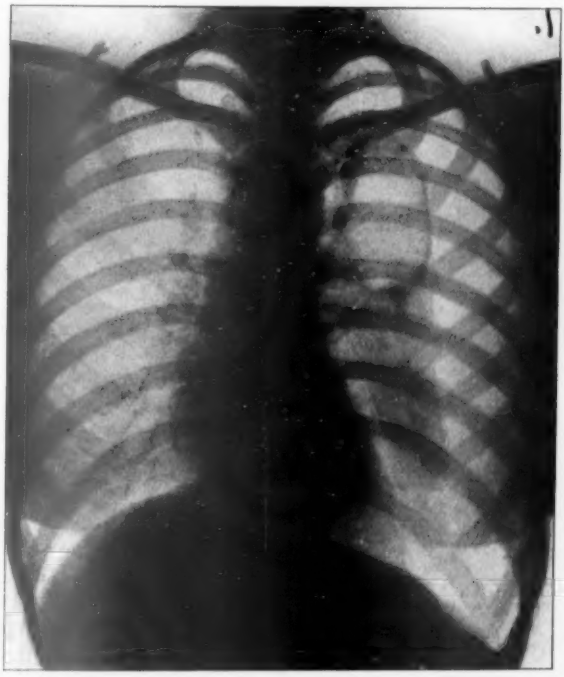

FIG. 2.—Miss F. S.

Mrs. G. Chest. (Fig. 4.) To demonstrate the persistence of a small lateral cavity in another case where the general health is excellent but a little sputum persists. This might be controlled by a localized plug of paraffin and render this patient safer to herself and her daughters, both of whom are at the very susceptible post-school age.

Mrs. D. Chest. (Fig. 5, p. 51.) This film has been brought to draw attention to a type of tuberculosis which is frequently far advanced and has given rise to a number of subsidiary cases before it is recognized. It is "lobular phthisis" or pulmonary tuberculosis confined to a single lobe. As it leaves a large portion of lung in a healthy state it is rarely discovered until it is old-standing, and this may clearly be seen in the detail of the sputum. In 90% of cases it is the right upper lobe which is affected. Usually it responds in a striking manner to pneumothorax, as in this case. (Fig. 6.) The contacts should always be examined.

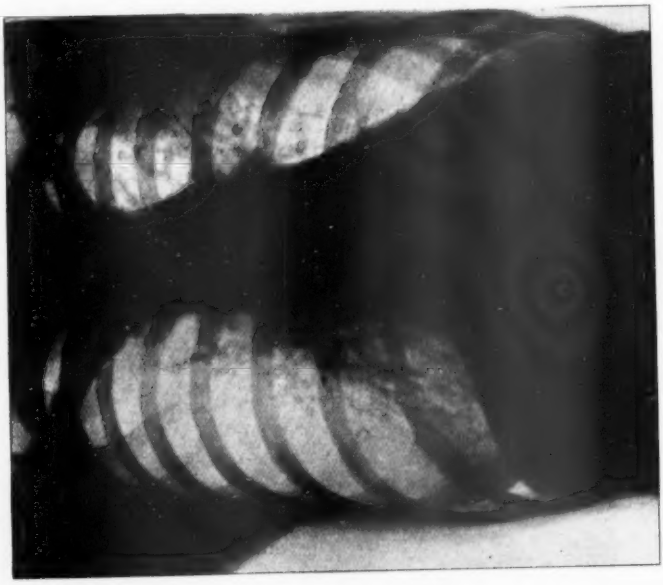

FIG. 4.—Mrs. G.

FIG. 3.—Mrs. O'N.

FIG. 6.—Mrs. D. After induction of pneumothorax.

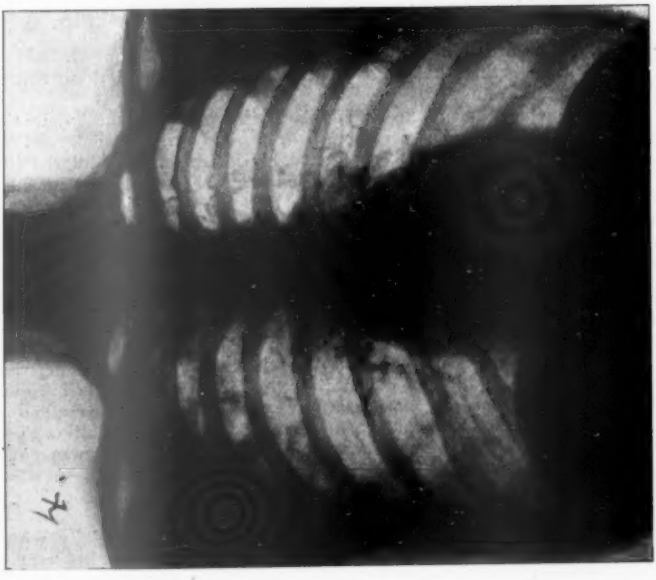

FIG. 5.—Mrs. D. on admission.

Conclusion

A small effort has been made in this paper to bring before the notice of the section:—

(1) The value of culture in tuberculosis.

(2) The great interest that lies in the detailed appearances of sputum in a microscopic film.

(3) The importance, in the control of the infection of tuberculosis, of collapse treatment for pulmonary disease.

The microscopic work described, in the correlation of microscopic detail and clinical case; the stress on the high importance to tuberculosis epidemiology of State support for operative treatment in sanatoria; and the insistence on the wide applicability and comparative ease of recent cultural methods of diagnosis, together constitute an approach to the epidemiology of the disease hitherto unemphasized or untrodden. The varying appearances of the bacilli and their cultural properties, and the proper care and isolation of the sputum-infective patient date back to the time of Koch, yet we have still to catch the full significance of his warning of the infectivity of the disease and its resting place in sputum and the home.

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Discussion.—Dr. J. N. O'REILLY said that his own experience with Löwenstein had been that animal inoculation was superior to Löwenstein's culture methods. Swedish workers, however, had assured him that Jensen's modification was quite as reliable as the guinea-pig method in detecting the presence of tubercle bacilli, and these results were in keeping with those of Dr. Holmes.

With regard to the epidemiology, he would like to know Dr. Holmes' views on children as sources of infection. He recalled Koeffler's careful study which went far to show that patients with small numbers of bacilli were not very infective. As children (other than those with phthisis) seldom had many bacilli in the sputum, he suggested that they were not an important epidemiological factor. He recalled also the discussion amongst prominent German workers who, while leaving the question open, considered that tuberculous children could be mixed with tuberculin-negative children without risk, but one or two writers had taken the contrary views.

Dr. GREGORY KAYNE said that having recently spent two months with Dr. K. A. Jensen at the State Serum Institute in Copenhagen, he felt that in Dr. Holmes' paper, the pupil was perhaps showing greater enthusiasm than the master. Jensen still used animal inoculation as well as the culture method, and Vera Lester, working in his department, had found—at any rate in the examination of gastric-lavage fluid for tubercle bacilli—that the guinea-pig method gave considerably more positive results than the culture method in children under the age of 5 years. There was no explanation for this at present, although the gastric juice probably played some part in regard to typing, the culture method was not infallible, and Jensen and Frimodt-Møller had isolated an appreciable number of strains which did not conform to typical cultural characters—eugonic bovine strains being more common than dysgonic human bacilli.

With regard to the infectivity of treated pulmonary cases, especially with artificial pneumothorax, further attention should be drawn to the routine examination for tubercle bacilli of the gastric-lavage fluid, even in adults, when there was no sputum. Clausen in

Denmark detected in this way twenty positives in a series of 38 adults in whom the bacilli were not found by other methods. Sayé, of Barcelona, Gravesen at Vejlefjord Sanatorium, and others, had also found an appreciable number of positive results by the same method. The question of infectivity of children showing bacilli in the stomach wash-out was still very much *sub judice*, but it was of interest to mention an experiment carried out by Söderling of Stockholm (personal communication). Guinea-pigs, about thirty in number —so far as the speaker could remember—were placed in the cots and beds of children, definitely diagnosed as pulmonary tuberculosis, for several hours each day for some time and the children were encouraged to play with them. None of the animals developed tuberculosis or showed tuberculous lesions when killed later.

The importance of surgical collapse methods in reducing available contagious material had been rightly stressed by Dr. Holmes. With regard to the phrenic operation the view was gaining ground, however, that evulsion at any rate should only rarely be carried out, as many of the patients in whom it was performed might later require a partial thoracoplasty and the latter operation was likely to be less successful if the healthy base of the lung had already been sacrificed.

Finally, Dr. Holmes' work on the varying appearance of tubercle bacilli in the sputum and its correlation to the age of the lesion was finding confirmation in the recent work of W. Pagel published in the *Journal of Pathology and Bacteriology* a few months previously.

Dr. HOLMES (in reply) said that two speakers in the discussion had referred to the infectivity of tuberculosis in relation to childhood. In the papers referred to she had discussed the varying infectivity of adults to children manifested by the varying microscopic detail of sputum, the varying exuberance of positive culture growths from sputum, and the obtaining of positive cultures from negative sputa. There was also the question of the infectivity of children amongst themselves. A recent Canadian writer had pointed out afresh the infectivity of children's excreta,[1] and two Danish workers had recently published a most interesting series of observations of school children, showing groups of children sitting close to each other, becoming tuberculized. As strict attention was given to the milk hygiene, and as there was no tuberculosis in the children's homes, it appeared extremely probable, if not certain, that they had infected each other. The danger of child-to-child infection seemed to be established to such a degree that tuberculosis-infected children should be removed from ordinary schools, and that "delicate" children not infected with tuberculosis, should not be sent to even "open-air" schools destined for the tuberculous.

In a recent communication Jensen had shown that culture was superior to guinea-pig inoculation for the human bacillus, and only very slightly inferior for the bovine bacillus, while difficulty in typing the human form by culture had occurred in one out of 1,525 instances, and in typing the bovine in one out of 256 instances. Stomach-wash water had certainly given better figures by guinea-pig than by culture in Denmark, but gastric lavage had as yet been very little practised in this country, and was not ever likely to be very popular.

1 *Tubercle*, 1934, xv, 498.

No. 61

The Royal Society of Medicine

Patron: H.M. THE KING

1, WIMPOLE STREET, LONDON, W.1

OFFICIAL BULLETIN

ANNUAL MEETING OF FELLOWS (1935)

HELD at the Society's House, on Tuesday, July 2, 1935, at 5 p.m.

Present: Dr. ROBERT HUTCHISON (President) in the Chair, Mr. C. W. GORDON BRYAN and Dr. ANTHONY FEILING (Honorary Secretaries), Mr. W. GIRLING BALL and Dr. G. DE BEC TURTLE (Honorary Treasurers), Professor WILLIAM BULLOCH (Honorary Librarian), Dr. E. A. COCKAYNE (Honorary Editor), Mr. G. G. TURNER (Chartered Accountant), eighteen Fellows, and Mr. G. R. EDWARDS (Secretary).

MINUTES of the last General Meeting were read and signed as correct.

ELECTION OF OFFICERS AND COUNCIL FOR 1935-1936 was proceeded to. The President appointed Dr. HALLS DALLY and Dr. A. M. H. GRAY as Scrutineers of the ballot which resulted in all the nominees being unanimously elected as follows:—

President:
ROBERT HUTCHISON, M.D.

Immediate Past-President:
V. WARREN LOW, C.B., F.R.C.S.

Honorary Secretaries:
ANTHONY FEILING, M.D.
G. T. MULLALLY, M.C., M.S.

Honorary Treasurers:
G. DE BEC TURTLE, M.D.
C. W. GORDON BRYAN, M.C., F.R.C.S.

Honorary Librarians:
V. ZACHARY COPE, M.S.
J. D. ROLLESTON, M.D.

4275-8-35.

Honorary Editors:

E. A. COCKAYNE, M.D.
E. K. MARTIN, M.S.

Other Members of Council:

W. GIBLING BALL, F.R.C.S.
Professor WILLIAM BULLOCH, M.D., F.R.S.
T. WATTS EDEN, M.D.
H. MORLEY FLETCHER, M.D.
Professor FRANCIS R. FRASER, M.D.
A. M. H. GRAY, C.B.E., M.D.
J. SWIFT JOLY, F.R.C.S.
G. L. KEYNES, F.R.C.S.
HUGH LETT, C.B.E., F.R.C.S.
IDA MANN, F.R.C.S.
GEORGE RIDDOCH, M.D.
J. A. RYLE, M.D.
Sir STCLAIR THOMSON, M.D.
H. L. TIDY, M.D.
R. A. YOUNG, C.B.E., M.D.

Presidents of Sections (i.e., ex-officio Vice-Presidents of the Society):

Anæsthetics	H. A. Richards, L.R.C.P., M.R.C.S.
Children (Disease in)	L. E. Barrington-Ward, F.R.C.S.
Clinical	E. G. Slesinger, O.B.E., M.S.
Comparative Medicine	J. C. G. Ledingham, C.M.G., M.B., F.R.S.
Dermatology	H. W. Barber, M.B.
Epidemiology and State Medicine	Surgeon Captain S. F. Dudley, O.B.E., R.N.
History of Medicine	E. W. Goodall, O.B.E., M.D.
Laryngology	Lionel Colledge, F.R.C.S.
Medicine	Sir Charlton Briscoe, Bart., M.D.
Neurology	F. L. Golla, O.B.E., F.R.C.P.
Obstetrics and Gynæcology	W. Fletcher Shaw, M.D.
Odontology	C. H. Howkins, C.B.E., L.R.C.P., M.R.C.S., L.D.S.E.
Ophthalmology	Ransom Pickard, C.B., M.S.
Orthopædics	C. Max Page, D.S.O., M.S.
Otology	Harold Kisch, F.R.C.S.
Pathology	Paul Fildes, O.B.E., M.B., F.R.S.
Physical Medicine	C. B. Heald, C.B.E., M.D.
Psychiatry	H. J. Norman, M.B.
Radiology	C. G. Teall, M.B.
Surgery	W. Sampson Handley, M.S.
Therapeutics and Pharmacology	Dorothy C. Hare, C.B.E., M.D.
Tropical Diseases and Parasitology	P. H. Manson-Bahr, D.S.O., M.D.
United Services	Air Commodore A. V. J. Richardson, O.B.E., R.A.F.
Urology	R. Ogier Ward, D.S.O., M.Ch.

A vote of thanks to the Scrutineers was passed by acclamation.

REPORT OF THE COUNCIL FOR SESSION 1934-35 was presented by the Senior Honorary Secretary and arising out of a suggestion made at the meeting it was decided to include the wording of the Society's Loyal Address to His Majesty King George V in the Official Bulletin of the Society.

AUDITED ACCOUNTS FOR SESSION 1933-34 was presented by the Senior Honorary Treasurer.

The President then moved from the Chair

That the Annual Report of the Council (including the Reports of the Honorary Secretaries, Honorary Treasurers, Honorary Librarians and Honorary Editors), together with the Audited Accounts, be received and adopted.

[*Carried unanimously.*

ELECTION OF AUDITORS: It was proposed by Mr. Girling Ball and seconded by Dr. Halls Dally that

> Messrs. Lord, Foster & Co., Chartered Accountants, be and are hereby elected Auditors of the Society for the year 1935-36.
>
> [*Carried unanimously.*

In proposing the motion Mr. Girling Ball spoke appreciatively of the services of Messrs. Lord, Foster to the Society.

RETIRING HONORARY OFFICERS: The President put the following motions from the Chair and in doing so thanked the Officers for their years of devoted service to the Society:

(*a*) That the best thanks of the Society are due and hereby cordially offered to Mr. C. W. Gordon Bryan, who is retiring after four years valuable service as Honorary Secretary.

(*b*) That the best thanks of the Society are due and hereby cordially offered to the Senior Honorary Treasurer, Mr. W. Girling Ball, who is retiring after six years valuable service.

(*c*) That the special thanks of the Society are due and hereby cordially offered to the Senior Honorary Librarian, Professor William Bulloch, who is retiring after ten years of devoted and energetic service.

RETIRING VICE-PRESIDENTS AND OTHER MEMBERS OF COUNCIL:

The President put the following motion from the Chair

> That the best thanks of the Society be offered to the retiring Vice-Presidents and Other Members of Council for their valuable services to the Society during their terms of office, viz.:—

Dr. H. P. Crampton Dr. R. C. Jewesbury Prof. R. T. Leiper Dr. Henry MacCormac Dr. J. D. Rolleston Sir StClair Thomson Mr. W. M. Mollison Sir Farquhar Buzzard Dr. S. A. Kinnier Wilson Mr. Eardley Holland Mr. Alan H. Todd Mr. E. A. Peters Dr. M. B. Ray Dr. David Forsyth Mr. Ransom Pickard Mr. Philip Turner Prof. J. H. Burn Major-General P. H. Henderson Mr. J. B. Macalpine	*Vice-Presidents.*
Rt. Hon. Lord Dawson of Penn Mr. C. H. Fagge Mr. W. S. Perrin Dr. Hugh Thursfield	*Other Members of Council.*

ANNUAL REPORT OF THE COUNCIL.

(1) The Roll of Fellows, Associates and Members of Sections.

Since the preparation of the last Annual Report, the losses by death and resignation have been:

	Deaths.	Resignations.	Total.
Honorary Fellows ...	3	--	3
Fellows	50	97	147
Corresponding Members	9	—	9
Members of Sections ...	5	21	26
Associates	—	9	9
		Total ...	194

There have been elected:

Honorary Fellows ...	5
Fellows	250
Corresponding Members	18
Members of Sections ...	11
Associates	17
Total	301

The Roll of the Society is now as follows:

Honorary Fellows (British) ...		...	22
Honorary Fellows (Foreign) ..		...	29
Fellows ...	Town ... 2119 Country 1765 Foreign 595	...	4479
Corresponding Members (British) ..		...	35
Corresponding Members (Foreign) ...		...	234
Members of Sections	Town ... 128 Country 133 Foreign 39	...	300
Associates			43
		Total ...	5142

(2) **Obituary.**—We regret to report the death of Sir Edward Sharpey-Schafer, Professor Santiago Ramon Y Cajal and Professor Theobald Smith, Honorary Fellows.

(3) **Honorary Fellows.**—The following were elected Honorary Fellows of the Society at the General Meeting of Fellows on May 21, 1935:—

Sir StClair Thomson, M.D.
Professor Sigmund Freud, M.D., LL.D. (Vienna).
Professor Joseph Jadassohn (Zurich).
Professor G. R. Minot, M.D. (Harvard).
Professor R. F. J. Pfeiffer (Breslau).

(4) **General.**—The Society presented a Loyal Address to His Majesty on the occasion of His Jubilee. The document was finely engrossed on vellum. The Society's house was decorated with flowers throughout the Jubilee Week.

During the session the co-operation of the Society has been sought by the Pharmacopœia Committee of the General Medical Council on the subject of the proposed publication of a "Guide to Newer Drugs". The Society also approached the Dental Board with a request that research on dental materials should not be discontinued.

The financial position of the Society has again improved thanks to (a) redemption of a few Subscription Bonds, (b) the investment of further sums in the Reserve Fund, (c) increase in the number of Fellows.

The accommodation provided by the Society's house has been discussed by a Sub-Committee appointed by the Finance and General Purposes Committee. While it was evident that the time was approaching when improved accommodation for the Society's meetings and Library facilities would have to be provided, the Sub-Committee recommended that nothing be done at present but that the situation be kept under observation.

The Council has appointed a Committee to discuss the possibility of co-ordination of programmes of Sections in order that they may the better work together. A beginning has been made with the Surgical Sections and, if the recommendations on the subject of programmes suggested by the Committee are a success in this group, similar co-ordination will be suggested for the remainder of the Sections of the Society.

The erection of Messrs. D. H. Evans's new building on the opposite side of Henrietta Street was considered by the Finance and General Purposes Committee and the Council, and protests were made which it is hoped will result in modifications to the structure such as will give a reasonable angle of light to the windows of the Society's house.

The Society has arranged to contribute a set of its "Proceedings" to the Kitasato Memorial Library.

The long standing convention of the Society that none except Honorary Fellows should describe themselves as such has been incorporated in the By-laws (No. I, 11).

The number of meetings held this session is 176 as compared with 165 last session; of these the following were held away from London:—Disease in Children, at Cardiff; Laryngology and Otology, at Bristol; Ophthalmology, at Nottingham; Orthopædics, at Bath; Surgery, at Cardiff, and Urology, at Paris.

(5) **The Society's House and its Equipment.**—The Society's house is now very well equipped, hence only small improvements have been made during the session, notably preservation of the busts of medical men of the last century, provision of new curtain rods in various rooms, a refrigerator for the kitchen and an articulated skeleton for use at demonstrations. Two rooms will be redecorated and the Barnes and West Halls cleaned during the summer.

(6) **Royal Society of Medicine Special Trust Fund.**—During the last five years the following have been provided:

A 35 mm. cinematograph projector for the Barnes Hall.

Two 16 mm. cinematograph projectors (one for the Barnes Hall and one for the West Hall).

Metal-coated projection screens in both halls.

A contribution of more than half the cost of erection of a cinematograph projection box and a new epidiascope for the Barnes Hall.

Contributions of books to the Library on three occasions.

Payment for research work in connection with and publication of the Society's Report on Hearing Tests.

(7) **Dinner of the Society.**—The Council decided in 1934 that the Dinner should be held biennially. The next Dinner will, therefore, take place on February 19th, 1936.

(8) **Special Discussions.**—The following discussions, arranged at the Conference of the Honorary Officers of the Society with the Presidents and Presidents-elect of the Sections, have been held during the Session:—

(1) "*How can the results of ante-natal care be improved?*" (Epidemiology and State Medicine, and Obstetrics and Gynæcology), November 23rd, 1934.

(2) "*Mental defects from the neurological and psychiatric standpoints*" (Neurology and Psychiatry), January 17th, 1935.

(3) "*Photo-dynamic sensitization—biological action and therapeutic application*" (Physical Medicine and Dermatology), January 18th, 1935.

(4) "*Some factors in the use of antiseptics*" (Odontology and Therapeutics and Pharmacology), March 25th, 1935.

(5) "*The problems of prophylaxis in pulmonary tuberculosis*" (Epidemiology and State Medicine, and Disease in Children), April 26th, 1935.

Discussions held by Sections have included the following:—

"*Unsettled questions of neurosyphilis*" (Neurology), October 18th, 1934.

"*The ultimate prognosis of coronary occlusion*" (Medicine), October 23rd, 1934.

"*The laryngeal paralyses*" (Laryngology), November 2nd, 1934.

"*Short-wave diathermy*" (Physical Medicine), November 16th, 1934.

"*The ætiology and treatment of asthma*" (Medicine) November 17th, 1934.

"*Nutritional anæmias*" (Comparative Medicine), November 28th, 1934.

"*Meningitis of otitic origin*" (Otology), December 7th, 1934.

"*Evipan*" (Anæsthetics), December 7th, 1934.

"*Mental hygiene: preventive measures in childhood*" (Psychiatry), December 11th, 1934.

"*The prevention and treatment of metastasis in carcinoma mammæ*" (Radiology), January 18th, 1935.

"*The diagnosis of diseases of the stomach*" (Medicine) January 22nd, 1935.

"*Hæmoglobinuria*" (Comparative Medicine), January 23rd, 1935.

"*The treatment of ureteric calculi*" (Urology) January 24th, 1935.

"*Assessment of the state of nutrition*" (Epidemiology and State Medicine), January 25th, 1935.

"*The after treatment of the radical mastoid operation*" (Otology), February 1st, 1935.

"*Treatment of chronic infection of the nasal accessory sinuses*" (Laryngology), February 1st, 1935.

"*Sterilization of women, including indications (medical and eugenic), technique and legal position*" (Obstetrics and Gynæcology—with Eugenics Society), February 15th, 1935.

"*The problems of rural water supply*" (Epidemiology and State Medicine), February 22nd, 1935.

"*Influenza*" (Comparative Medicine), February 27th, 1935.

"*Diagnosis of senile deafness and its amelioration*" (Otology), March 1st, 1935.

"*Distant radiation for new growths of the upper respiratory tract*" (Laryngology), March 1st, 1935.

"*Fractures of the tibia involving the knee joint*" (Orthopædics), March 5th, 1935.

"*The training of a surgeon*" (Surgery), March 6th, 1935.

"*The treatment of angina pectoris*" (Therapeutics and Pharmacology), March 12th 1935.

"*The treatment of injuries*" (Physical Medicine), March 15th, 1935.

"*The role of cholesterol in health and disease*" (Medicine), March 26th, 1935.

"*The radiological diagnosis of renal lesions, excluding stone*" (Urology), March 28th, 1935.

"*Traumatic shock*" (Surgery), April 3rd, 1935.

"*Radiological problems and mistakes*" (Radiology), April 12th, 1935.

"*The conservative surgery of carcinoma of the rectum*" (Surgery--Sub-section of Proctology), May 8th, 1935.

"*Diet in pregnancy*" (Obstetrics), May 17th, 1935.

"*The scope and indications for renal sympathectomy*" (Urology), May 23rd 1935.

(9) **Scholarships, Prizes and Medals.**—The Seventh Award of the Gibson Research Scholarship for Medical Women will be made in July. The Sixth Award of the Society's Gold Medal has been made to Sir Archibald Garrod. The Second Award of the Norman Gamble Prize has been made to Mr. C. S. Hallpike and research grants from the Fund have been given to Mr. H. B. Lieberman and to the Ferens Institute. The Eighth Award of the Jenner Medal has been made to Sir George Buchanan. The First Award of the Hickman Medal has been made to Dr. Wesley Bourne. The Second Award of the Colyer Prize has been made to Mr. Ernest Matthews.

(10) **Lectures.**—A Special Meeting of Fellows was held at which Professor R. G. Minot (Harvard) the Nobel Prize-Winner, gave a lecture on "Some aspects of anæmia".

The Dixon Memorial Lecture was delivered by Sir Henry Dale to the Section of Therapeutics and Pharmacology. The title was "Pharmacology and nerve endings".

The Lloyd Roberts Lecture will be delivered by Mr. Wilfred Trotter in the autumn and the title will be "General ideas in medicine".

(11) **Receptions.**—Two receptions have been held during the session as follows:—

On Thursday, November 8th, Professor Arturo Castiglioni gave an address on "The ancient University of Padua and its English scholars".

On Thursday, April 11th, Mr. Robb Lawson of the United Artists Corporation, gave an address on "The embryology and anatomy of Micky Mouse, with clinical demonstration".

A Reception to the International Neurological Congress will be given on August 2nd.

(12) **Delegates and Representation of the Society on outside bodies.**—The Society has appointed Delegates to the following:—

XIth International Congress of the History of Medicine—Dr. J. D. Rolleston and Dr. J. F. Halls Dally.

Royal Institute of Public Health—Annual Congress: Dr. S. A. Monckton Copeman.

Queen's Institute of District Nursing—Representative on Council: Dr. G. de Bec Turtle.

British Social Hygiene Council—Annual Congress: Dr. G. Clark Trotter.

Congress of British Obstetrics and Gynæcology—Representative on Executive Committee: Mr. A. J. McNair.

Centenary Celebrations of Dr. V. Magnan—Dr. G. W. B. James.

IXth International Congress of Dermatology and Syphilology—Dr. Henry MacCormac.

(13) **Library Endowment.**—Miss G. L. Medwin has kindly made her usual contribution of £5 to the Library. The Honorary Librarians will be very grateful for further contributions in order to preserve and improve one of the finest medical Libraries in the world.

(14) **Meetings of Outside Societies.**—During the past year the use of the Society's meeting rooms has been accorded to the following:—

Association of Physicians.
British Association of Dermatology and Syphilology.
British Journal of Urology.
British Psychological Society.
Council of British Ophthalmologists.
Fellowship of Medicine and Post-Graduate Association.
Guarantors of "Brain."
Hospital for Epilepsy and Paralysis.
International Congress of Physiotherapy.
International Association for the Prevention of Blindness.
International Congress of Ophthalmology.
International Neurological Congress.
International Organisation in the Fight against Trachoma.
International Society of Medical Hydrology.
Journal of Anæsthesia.
Journal of Laryngology.
Medico-Legal Society.
National Council for Mental Hygiene.
National Hospital for Diseases of the Heart: St. Cyres lecture.
Ophthalmological Society of the United Kingdom.
Robert Jones Memorial Fund.
Royal Medico-Psychological Society.
St. John's Hospital Dermatological Society.
University of London: Faculty of Medicine.
Semon Lecture.
Visiting Association of Throat and Ear Surgeons.
West End Hospital for Nervous Diseases: Savill Oration.
West London Medico-Chirurgical Society.

(15) **Staff.**—The year has been an exceptionally busy one for the staff and they have again shown the greatest enthusiasm and loyalty in carrying out the work; the prolonged illness and death of the Head Librarian threw additional work on the members of all departments and they deserve much gratitude, especially the Secretary, whose keenness, imagination and energy have as usual proved of the greatest value.

The passing of Mr. Powell after such long service is a great loss to the Society. He came in 1907 as an unsalaried pupil and was appointed to the permanent staff in the following year. Since 1920 he held the post of Head Librarian and his outstanding efficiency and success will long be remembered by all.

Mr. Powell's services to the Society were given with unsparing devotion and his work was made exceptionally heavy by the very great increase of the activities of the Library and the expansion of the Society. In the last few years he loyally supported the economies that had to be practised with all the added strain that they involved.

Following Mr. Powell's death, Mr. Home has been appointed Head Librarian, and Mr. Bishop (from the Library of the Royal College of Physicians) has been appointed Sub-Librarian.

Mr. Home has worked very hard indeed, even to the extent of forgoing a summer vacation, in performing the duties of Head Librarian during Mr. Powell's absence, and he has most ably proved his worth. He deserves the best thanks of the Society for his devoted and successful labour.

During the year two Library Assistants have obtained important posts as Librarian elsewhere and their places have been satisfactorily filled.

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(16) ANNUAL REPORT ON THE PROPERTY OF THE SOCIETY.

Hanover Square.—The former house of the Society, is let to Messrs. Knight, Frank & Rutley at a rental of £2,500 per annum plus the responsiblity for the fabric; their lease expires in March, 1990. The Society's lease of a portion of this property, Dering Yard, expires in September, 1969; the remainder is freehold.

Wimpole Street.—The site is held on a lease expiring on April 6th, 2912, from the Howard de Walden Estate at a ground rent of £400 per annum. The value of the house, site and furniture is given in the Balance Sheet at the figure of £43,934 4s. 0d. *pro forma.*

Furniture, Apparatus, etc.—Is continually inspected, repaired and replaced when necessary.

(17) HONORARY TREASURERS' REPORT FOR SESSION, 1933-34.

The income of the Society for the session was £23,073 17s. 6d. an increase of £475 14s. 11d. on the previous year. The total expenditure was £20,774 0s. 11d., being an increase of £304 13s. 8d. on last year, chiefly due to fluctuations in the cost of the "Proceedings" and the Library. The surplus of income over expenditure was £2,299 16s. 7d.; this is more than double the margin of safety indicated as desirable by the Society's Honorary Financial Advisor, and the position may therefore be considered very satisfactory.

The capital debt was reduced during the session by £373, thanks to repayment of Subscription Bonds. This debt stood at £18,482 on September 30th, 1934, and consisted of £11,200 Debentures and £7,282 Subscription Bonds. The amount set aside in the Reserve and other Funds to offset these liabilities now amounts to £8,812. The Debentures are due for repayment at par in 1939. The Subscription Bonds are repayable at par on three months' call.

(Signed) W. GIRLING BALL, G. DE BEC TURTLE } *Honorary Treasurers.*

(18) ANNUAL REPORT OF THE HONORARY LIBRARIANS.

The following statistics show the main activities of the Library during the year June, 1934—June, 1935:—

Readers in Library	36,722
Books borrowed for home use	29,702
Parcels of books sent	8,975
Lists of references prepared	1,004
Abstracts supplied (translated 484; requests 157)	537
Photostat copies made	1,500
Volumes bound	2,211
Books purchased	409.
Books presented	414
Pamphlets presented	633
Books catalogued	1,306
Catalogue Revisions	987

Periodicals.

Purchased	521
Received in exchange	356
Presented	308
	1,185

Reports.

Purchased..	36
Received in exchange	5
Presented	174
	215

It will be seen that the work in all sections of the Library service is being steadily maintained without showing any dramatic rise, which bears out the expectation of last year that the work has now reached its normal level in direct relation to the number of Fellows of the Society.

Prosser White Memorial Fund: The first annual income of £4 has been received from this fund, and has been expended on works of dermatological interest, in accordance with the bequest.

Special Trust Fund: The Library has benefited since June, 1934, to the extent of £80, expended on more expensive standard monographs, through the generosity of the Committee of this fund.

Lighting in the Library has been considerably improved by the installation of extra lights under the gallery, and by the addition of standard reading lamps to the centre tables.

Book accommodation has been extended by the addition of two steel stacks in the Library Basement, together with a further run of shelves along the west wall of the Basement for the accommodation of quarto volumes.

Library Classification: Owing to the extraordinary increase in the number of textbooks and monographs added to the Library during the past decade it has been found necessary to adopt a much more detailed system of classification than the very broad Baconian system which had been found satisfactory in the past. Accordingly, after careful consideration, the Universal Decimal System of Book Classification has been adopted.

Cataloguing: Much steady progress has been made in general revision of the catalogue, in addition to keeping well abreast of the current accessions. This invaluable revision has meant that many hundreds of fresh entries have been incorporated in the catalogue, and as it is expected that a similar amount will be added in the next session, the question of a larger catalogue cabinet must again be raised.

Portraits: The collection of engraved portraits is now housed in dustproof baize-lined portfolios for its better preservation.

Bibliographies and Lists of References: Copies of these, prepared at the request of Fellows, are now filed in the main Library with the object of building up a simple ready reference index to current literature.

Death of Mr. Powell: The Society has suffered a severe loss by the death of Mr. H. E. Powell, the late Librarian. To mark its appreciation, the Council has ordered that a memorial be placed in the Library recording Mr. Powell's long and meritorious service.

(Signed) WILLIAM BULLOCH
V. ZACHARY COPE } *Honorary Librarians.*

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(19) REPORT OF THE HONORARY EDITORS, 1934-1935.

The "Proceedings" for this Session have improved both in the quality of the material submitted and in the efficiency of the editing by the Sectional Officers.

For this improvement to continue it is imperative that all concerned should bear in mind the importance of securing first-class material for meetings, and of editing that material strictly before publication. Work which has already been published should be excluded.

Joint Discussions occasionally contain papers which, though individually of excellent quality, show insufficient connection with each other. They could certainly be improved by more careful co-ordination in preparation. Such co-ordination would avoid overlapping both by the openers and by later speakers.

The practice of dispensing with the services of a reporter at meetings has proved its worth, and it is hoped that it will become uniform throughout the Sections.

The exclusion of the reporters of other journals (*i.e.* the holding of meetings in camera), has been put into effect on several occasions with most satisfactory results. It is hoped, therefore, that this may become a general practice also.

A small but effective improvement has been made in the printing of the "Proceedings", in that the first page of each fasciculus is now numbered. This should facilitate the use of the index.

The finances of the "Proceedings" continue satisfactory, thanks to the good circulation which the periodical now enjoys as a result of improving quality and strict editing.

While congratulating the Sectional Editors on their work, the Honorary Editors feel strongly that there is considerable room for improvement, both as regards punctuality in attention to the work, and firmness in dealing with it.

(Signed) E. A. COCKAYNE
E. K. MARTIN } *Honorary Editors.*

LOYAL ADDRESS OF THE ROYAL SOCIETY OF MEDICINE TO H.M. KING GEORGE V ON HIS TWENTY-FIVE YEARS JUBILEE.

TO THE KING'S AND THE QUEEN'S MOST EXCELLENT MAJESTIES:

MAY IT PLEASE YOUR MAJESTIES.

We the President Council Fellows Associates and Members of the Royal Society of Medicine desire to convey to Your Majesties with our loyal duty our sincere and heartfelt congratulations on the occasion of Your First Jubilee, our hopes that You may long continue to reign over this Country and Empire, and our confidence that under Your Reign they will continue to grow in happiness, in prosperity and in attachment to Your Persons and to the Throne.

We deeply and gratefully appreciate the interest which Your Majesties have invariably shown in the health and well-being of Your Subjects and in particular we are very sensible of the honour You have conferred upon our Society and upon the profession at large by Your Royal Patronage.

During the twenty-five auspicious years of Your Majesties' reign the Royal Society of Medicine has increased and prospered in its work in the furtherance of the art and science of medicine in all its branches and we look forward to many peaceful years of progress and development under the same happy auspices.

ROBERT HUTCHISON *President.*

C. W. GORDON BRYAN, ANTHONY FEILING } *Honorary Secretaries.*

W. GIRLING BALL, G. DE BEC TURTLE } *Honorary Treasurers.*

G. R. EDWARDS, *Secretary.*

The Address was finely engrossed on Brentford vellum and received a special acknowledgment from the Home Office on behalf of His Majesty.